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Thru the Ages with Hughes Rock Bits

Painted for the Hughes Tool Research Division Collection by John Pemberton Cowan

THE CARBONIFEROUS PERIOD: *Pennsylvanian and Mississippian: consisted of a luxuriant growth of plant life which was later compressed into thick coal beds and other hard formations. Pictured above* are animal and plant life of the period, including primitive amphibious reptiles and huge flying insects.*

*Full size color prints of this original painting will be sent upon request.

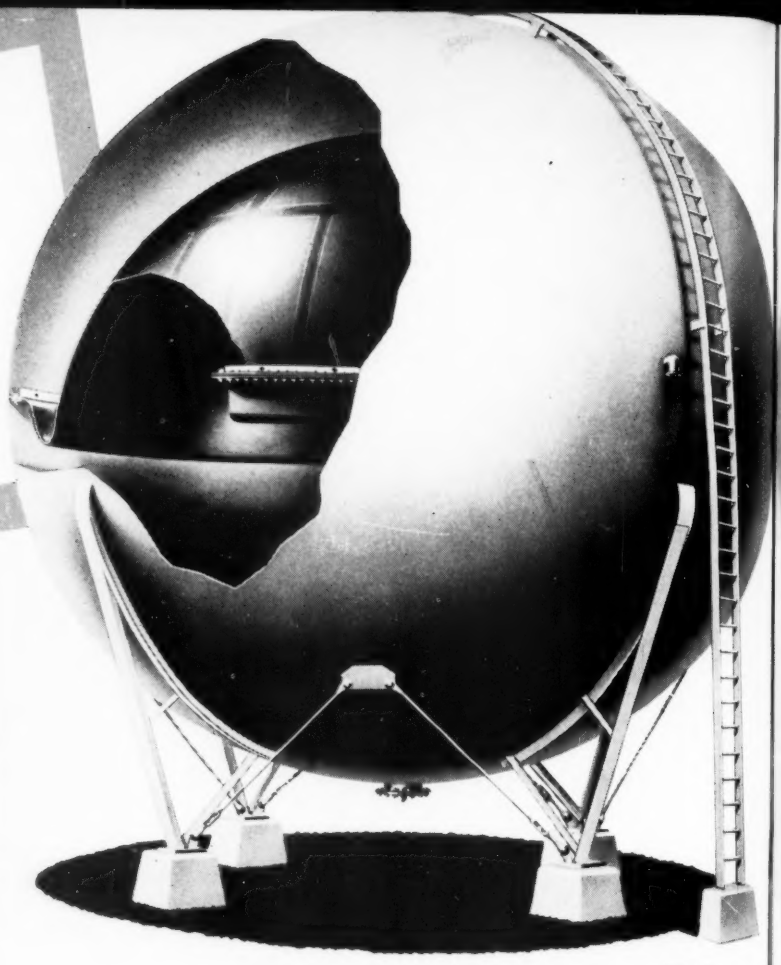
Drilling fast, straight, full gage hole through the stubborn, massive sandstone and limestone formations of the Carboniferous period is better accomplished by HUGHES OWS ROCK BITS! For nearly forty years operators have depended upon the maximum efficiency at minimum cost afforded by HUGHES ROCK BITS in all formations!

Hughes TOOL COMPANY HOUSTON, TEXAS
Standard of the Industry

PRICE 20 CENTS TABLE OF CONTENTS PAGE 49 SEPTEMBER 7, 1946

Another

NEW HORTON PRODUCT for the PETROLEUM INDUSTRY



Patents Applied for

the VAPORSPHERE

. . . a new device to prevent evaporation loss from one or more fixed-roof storage tanks

The prevention of evaporation losses from fixed roof tanks storing crude oil or gasoline can now be accomplished with the Horton Vaporsphere.

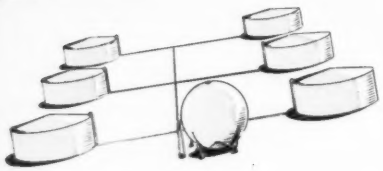
Here's how the Vaporsphere operates. Vapor forced out of the tanks by breathing (due to daily temperature changes) or by unbalanced filling and emptying flows through large-diameter piping into the Vaporsphere. When these conditions are reversed, the vapor returns to the tanks. Thus, evaporation losses are prevented.

On the inside of the Vaporsphere there is a hemispherical membrane made of flexible material. The edge of this membrane is fastened to the shell at the equator. The vapor enters the Vaporsphere below the membrane, billowing it upward. At the same time, an equal volume of air above the membrane is displaced through a vent at the top of the shell. When the Vaporsphere is full of vapor, the membrane rests against the top hal of the shell.

As the vapor returns to the storag tanks, the membrane descends and a enters the space above it through th top vent. When the Vaporsphere *completely* empty, the membrane is i contact with the bottom half of th shell. Thus, the shell safeguards th membrane *both* when the Vapor sphere is full or empty.

The Vaporsphere is normally oper ated at a pressure of 1/8 to 1/4 in. water, but can be designed for us with Hortonspheroids and Hemi spheroids operating at low pressures Installations can be made in connec tion with new tanks or existing tanks without taking them out of service

The Horton Vaporsphere is a product o Chicago Bridge & Iron Company, design ers and fabricators of the Horton Double Deck *Floating Roof and other evaporation saving products for the petroleum indus try. Write our nearest office for detail*



How to Use the VAPORSPHERE to Form a Complete Vapor-Saving System

This diagrammatic sketch shows a Vaporsphere connected to the vapor spaces of six cone-roof tanks. Vapor displaced from the tanks by daily breathing or by unbalanced filling and emptying flows through the lines into the Vaporsphere and later returns to the tanks . . . thus preventing evaporation losses.

The Vaporsphere may also be used to reduce filling losses from pressure vessels such as Hortonspheroids or Hemispheroids which operate at pressures of approximately 2½ lbs. per sq. in.

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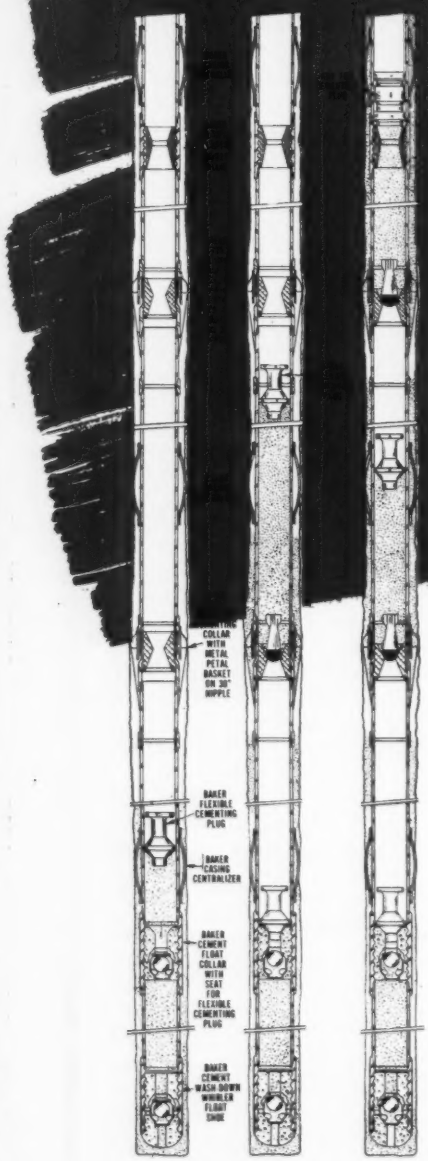
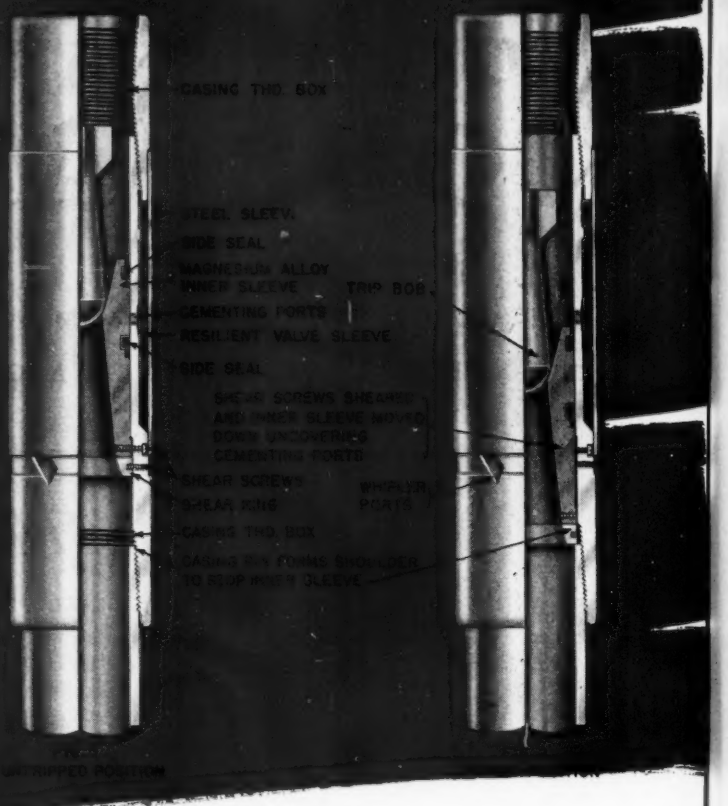
FOR MULTIPLE-STAGE JOBS

Baker Multiplex Cementing Equipment!


COLLAR WITH METAL PETAL BASKET ON 20' NIPPLE
BAKER FLEXIBLE CEMENTING PLUG
BAKER CASING CENTRALIZER
BAKER CEMENT FLOAT COLLAR WITH SEAT FOR FLEXIBLE CEMENTING PLUG
BAKER CEMENT WASH DOWN WHIRLER FLOAT SHOE



Developed for depositing a continuous encasement of cement around a blank string of casing at pre-determined intervals, to make sure that the cement completely fills the annulus, and that channeling is reduced to a minimum.

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• Eliminates necessity for auxiliary cementing string, special running-in or cementing tools of any kind. • Variety of combination hook-ups to meet different well conditions and cementing problems. • Use of Slidably Mounted Metal Petal Basket greatly increases probability of successful initial water shut-off. • Adaptable to either plug or displacement cementing method for each stage of a multi-stage cementing job.

SIMPLE CONSTRUCTION — POSITIVE OPERATION

The specially designed Multiplex Cementing Collar with male and female threads, or double female threads as shown above, is provided with whirler cementing ports and a resilient sleeve (reinforced with bias canvas) which acts as a back-pressure valve on the periphery of the collar and is protected by a steel sleeve around its exterior. A magnesium alloy inner sleeve, with a tapered hole through its center, covers the cementing ports and is held in place by shear screws until tripped. The mechanism is operated by a Trip Bob made from a hollow magnesium alloy casting, filled with lead to give it sufficient weight. This Trip Bob has a resilient seal on the lower end for sealing off in the seat of inner sleeve.

NEW BULLETIN GIVES ALL DETAILS

A new 8-page bulletin contains specifications on BAKER Multiplex Cementing Collars and auxiliary equipment. Illustrates and describes how to perform Two-Stage and Three-Stage Cementing jobs and contains other interesting data. Any oil man is welcome to a copy—ask for yours today.

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THE OIL AND GAS JOURNAL

Natural-Gas Facts

EXECUTIVES and economists who have had time to digest the lengthy natural-gas investigation just completed by the Federal Power Commission are in agreement that the presentation of testimony has certain positive values for the oil and natural-gas industries, whether or not the evidence has dissuaded the commission from asking Congress for additional regulatory powers. It brought together a comprehensive compilation of data which will provide the basis for many future studies and reports.

While FPC may continue to reach for regulatory powers not now specified in the natural-gas act, at least the investigation has narrowed the direction of this extension and should go far in eliminating many extraneous issues. The commission may seek more control over field prices of gas and over direct industrial sales, but such a plea will now be based on protection of rates to consumers rather than on vague social-control theories as has been the inclination in the past.

The coal industry made a pretty poor case for federal suppression of gas for the bald purpose of protecting coal's markets. The commission seemed impressed with the futility of attempting to fix specific markets and uses for every competing fuel and source of energy, and also with the fact that the spur of competition from gas is just beginning to cause the coal industry to do a little research for the benefit of its customers. Other situations clearly revealed by the investigation are:

Gas reserves are tremendous and increasing, belying fears of an imminent shortage.

The economical production of synthetic gas from low-grade coal is just over the horizon, promising a new source of reserves.

There is a huge and insistent consumer demand for natural gas far away from producing areas, making it impractical for a government body arbitrarily to deny service to a certain area.

The oil industry's fears of FPC regulation of wet-gas production are based on very real and practical operating problems.

State regulatory commissions are doing a good job, alive to their responsibilities and jealous of their jurisdiction.

Conservation requires a fair field price for gas and more outlets.

The theory that gas reserves should be impounded for future generations raises the unsolvable problem of who should reimburse the owners.

Delays in FPC proceedings, many of them caused by obstructionist tactics of coal interests, are a real and unnecessary burden on the industry.

This investigation has clarified the industry's thinking on regulatory problems, strengthened its position, and provided much ammunition for any future controversies over state and federal legislation.

Oil Men Feel Time Not Ripe for Long-Range Foreign Policy

WASHINGTON. — Discussions here and in eastern oil centers reveal a viewpoint that unless the State Department has an international chestnut to pull out of the fire, it is a bit premature to attempt to establish a long-range petroleum policy on the premise that the entire globe faces a chronic shortage of crude oil.

The program suggested in public utterances by the top oil men in the department are based on two current facts: First, that U. S. consumption of petroleum products is increasing, and second, that discoveries of new reserves are not at the moment keeping comfortably ahead of the consumption trend. From this it is reasoned (1) that we will soon have to import huge quantities of oil, (2) that there will be a world-wide scramble for foreign crude reserves, and (3) that the United Nations should control the world's oil development and distribution to prevent unfairness and friction.

Oil executives and economists point out that no one can prove these things may not come to pass, but there certainly are objections to rushing into such a program at this time. In the first place, as every oil man knows, there have been oil-shortage scares many times in the past, and each time the doleful experts have been proved wrong. There are many untested potential oil-bearing areas in this country, and the industry should be given a couple of years of exploratory work, free from the handicaps of wartime and postwar problems, before judgment is passed on our future reserves.

Would Act as Deterrent

In the second place, according to oil men, the possible future need for imports should not be flung into the face of present-day industry in such a way as to discourage oil men from developing domestic resources. A program of forcing imports of cheap foreign oil, it is claimed, is the quickest way to discourage investment in new exploratory and production ventures. In the third place, no American company will seek to develop foreign reserves if there is a possibility that its contracts will be renegotiated and perhaps canceled by an international control body.

These extreme interpretations are probably not what the State Department officials had in mind, but carried to these conclusions they defeat the stated objectives of strengthening the position of both domestic and foreign activities of American oil operators.

The suggestions are premature because our long-range oil policy is still in the making—and so is our international policy for insuring peace and promoting world trade.

Some time in the next 6 months the O'Mahoney petroleum committee of the Senate will file a report outlining the essentials of a national oil policy. Secretary of the Interior Krug has proposed a national inventory of our natural resources and a series of industry conferences in the near future to discuss long-range policy. The National Petroleum Council which Krug appointed largely for this very purpose is yet to be heard from on the policy question. The Independent Petroleum Association of America has again asked the State Department to call an industry conference to discuss import policy, its first request several months ago having been ignored. The Anglo-American petroleum agreement, described as a trial of international oil cooperation, has yet to be ratified and tested out. The United Nations itself is still in the throes of organization, and its economic council has not even been set up.

Possibly the State Department's only objective was to stimulate discussion, in which case it succeeded.

OGD to Pass on Draft Deferment Applications

WASHINGTON. — Applications for draft deferment of essential men in the petroleum and natural-gas industries will be passed on by the Oil and Gas Division of Interior Department under a delegation of authority from Civilian Production Administration, but the new procedure indicates that the percentage of deferments will be far smaller than during the war when oil was an essential industry.

Now oil workers are not even in the category of "essential to reconversion," and each application from an employer or self-employed person will be considered on its individual merits, and Selective Service has indicated that good proof of essentiality will be needed to defer a man under 29.

Applications should be made in triplicate on Selective Service Form 42A (Special Revised) obtainable at local draft boards, and submitted to the CPA's Office of Labor Requirements in Washington. They should give complete details of the man's work, his educational background, and his importance to the business. Deferment can be expected only if it is shown that the man is clearly in one of the three categories of supervisory, technical, or scientific personnel.

Supervisory personnel are those responsible for directing and coordinating the activities of a group of workers on a specific job. Technical personnel are employes who by reason of specialized training or work experience are particularly qualified to perform work of a highly technical nature, such as engineers. Scientific personnel are those educationally qualified to perform professional work in the physical sciences and whose activities are immediately and directly related to production processes.

Crude Price Advanced in Pennsylvania, Louisiana

Stanolind Oil & Gas Co. last week posted a new price for crude from the Jennings (Evangeline) field, Acadia Parish, Louisiana, increasing the price 5 cents per barrel throughout the gravity range.

The new price begins at $1.47 per barrel for below 32° A.P.I. gravity crude with a 2-cent differential up to $1.65 for 40° and above. At the same time, due to what Stanolind officials said was a rearrangement of its marketing setup, the company withdrew as a purchaser in the Magnolia Sealy South, Pyote, and Spencer fields, Ward County, Texas.

A 6-cent increase in the posted price of northern district grades of Pennsylvania grade crude, effective September 1, was announced last week by South Penn Oil Co. The advance brings the market price to $3.41 per barrel, not including the government subsidy which was reduced from 75 to 50 cents. South Penn's action covers oil in National Transit and Bradford Transit lines in the Allegany (Wellsville, N. Y.) and Bradford (Pa.) districts.

Shell to Open Laboratory

SAN FRANCISCO.—Shell Oil Co., Inc., will dedicate its new agricultural laboratory at Modesto, Calif., September 11. Approximately 300 will inspect the new laboratory and experimental farm which are a coordinated activity of Shell Oil, Shell Chemical Corp., and Shell Development Co. Representatives have been invited from the press, public life, agricultural university staffs, and from the state and federal departments of agriculture.

Stripper-Well Subsidy Reduced 25 Cents by OWMR Order

WASHINGTON.—The stripper-well subsidy has been reduced 25 cents per barrel, effective August 1, by a decision of the Office of War Mobilization and Reconversion.

This means that the subsidy has been completely eliminated in all pools where the payment was 25 cents or less, which, in general, was paid in pools where the wells had an average production of between 5 and 9 bbl. per day; cut to 50 cents in the Pennsylvania Grade crude area, and reduced to 10 cents in pools where the rate had been 35 cents.

The cut was based on the general industry-wide increase of 25 cents per barrel in posted prices. If the posted price has advanced more than 25 cents since OPA ceiling prices were removed the subsidy is to be reduced accordingly, but the reduction of 25 cents applies even where the posted price has not increased by 25 cents, as is the case in some heavy-oil fields in California. Any future increase in the posted prices will mean an equivalent reduction in the subsidy.

The directive was issued by John R. Steelman, director of economic stabilization, to instruct the Office of Price Administration and the Reconstruction Finance Corp. in carrying out the mandate of Congress that the stripper subsidy is to be continued until April 1, 1947, but at a reduced rate. Presumably the new policy will be continued until that date. OWMR stated that it will save the Government $2,500,000 per month.

The directive continues the authority of OPA to add new pools to the subsidy payment list, but only those pools producing an average of less than 5 bbl. per day per well will be eligible except that pools producing up to 9 bbl. may obtain the subsidy if they have special high-cost factors and the cost is not out of proportion with the output obtained.

Jersey Standard's Baton Rouge Plant Processes Billionth Barrel of Crude

BATON ROUGE, La.—A program of additions and replacements at the Baton Rouge refinery of Standard Oil Co. of New Jersey was outlined last week concurrent with the announcement that the refinery had processed its billionth barrel of crude August 29.

M. W. Boyer, vice president and general manager of the refinery, in an informal message told employes that they had "passed another mark in refinery achievement of which you and the entire oil industry can be proud." The improvement program announced at the same time by Boyer ultimately will involve expenditure of several million dollars.

The projects on which work has already begun include replacement of an old section of the refinery docks, addition of a new synthetic alcohol unit, and expansion of research laboratory facilities. Some of the other construction work for which engineering designs and estimates are now being developed will include additions to gasoline-manufacturing installations and extension of facilities for the production of wax.

"When the new alcohol unit is completed Baton Rouge will be one of the most important centers of synthetic alcohol production in the country," Boyer said. The new laboratory plans for which were announced last year will provide a major petroleum research center.

Boyer said the plant's production is at an all-time high and that the new program will provide additions and replacements deferred during the war which will assist in meeting postwar requirements.

The Louisiana refinery became the first domestic refinery in the Jersey company to achieve the billion-barrel processing record. The announcement pointed out the figure was not a record that added few refineries in the world had approached the figure. The Aruba, West Indies, refinery of Lago Oil & Transport Co., a Jersey Standard affiliate, passed the billion-barrel mark March 15, 1945.

First crude was charged at the Baton Rouge refinery November 15, 1909. Kerosene and coal oil was the principal product. The refinery now employes about 8,500 persons, in comparison to the 750 at the time of the first crude run.

Hydrocarbon Research, Inc., Group Leaves for Germany

WASHINGTON. — Four technical experts, all associated with Hydrocarbon Research, Inc., in New York, have left the United States for Germany where they will investigate German developments in the use of oxygen in the synthesis of liquid hydrocarbons under the direction of the technical industrial intelligence division, Office of Technical Services of the Department of Commerce.

The members of the group are Dr. Clarence A. Johnson, Norman F. Buschow, Edward G. Engel, and Dr. Judson B. Swearingen. A Department of Commerce announcement said they will study particularly oxygen-production methods and that their findings will be made public later.

Another investigation into Germany's wartime production techniques—that of the recovery of sulfur from refinery and smelter gases, will be made by Gordon A. Cain, chemical engineer, Freeport Sulphur Co., who also left for Germany this month, the Commerce Department said.

Former Hanlon Properties Taken Over by Warren Oil

All oil operations heretofore conducted by Henaghan & Hanlon, Inc., were taken over September 1 by Warren Oil Corp., a wholly-owned subsidiary of Warren Petroleum Corp. which acquired the Hanlon companies last May.

On the same date Hanlon-Buchanan, Inc., which has conveyed all of its oil properties to Henaghan & Hanlon, Inc., also will be dissolved, Warren officials said. By the dissolution of the two corporations, all oil operations of the former Hanlon companies now will be owned and operated by the Warren corporation with headquarters in Tulsa. J. H. Boyle will be president and in active charge of Warren Oil Corp., and will continue as vice president of Warren Petroleum Corp. in charge of its crude-oil division. Oil properties involved comprise producing wells and leases in Oklahoma and Texas. Operating personnel will continue unchanged, according to Warren officials.

Louisiana Allowable Set

BATON ROUGE, La.—September allowable in Louisiana has been set at 430,742 bbl. daily, according to Joseph L. McHugh, commissioner of conservation. Of the total, 335,439 bbl. was allotted to South Louisiana fields and 95,303 to North Louisiana fields. The September allowable is a slight increase over the August figure of 429,405 bbl.

Petrochemistry in Forefront of Discussion at A. I. Ch. E. Meeting

SAN FRANCISCO.—Approximately 700 chemists from all parts of the country attended the western regional meeting here August 26-28 of the American Institute of Chemical Engineers.

Special emphasis was focused on papers dealing with petroleum chemistry which occupied an entire section of the regional program. James G. Vail, Philadelphia Quartz Co., presided at the Monday and Tuesday sessions devoted to papers on petroleum chemistry which covered numerous developments in processing and products which ocurred during the war.

Honorary chairman of the meeting was W. Hirsckind, Dow Chemical Co. The afternoon session August 27 was devoted to a symposium on the new western chemical industry which included general discussion of the part petroleum is playing in building a new chemistry empire. The symposium was conducted by John R. Callagham, San Francisco representative of Chemical and Metallurgical Engineering.

Interest in Desulfurization

A number of papers dealing with new chemical developments were given. Continued and increasing interest in desulfurization is accented by the presentation of the molybdate process of Union Oil Co. of California, in which sulfur is removed from petroleum fractions by treatment of hydrogen. By this process, Clyde Berg and collaborating authors show that desulfurization is feasible for refinery stocks of more or less waste materials generally considered suitable only for fuel-oil components. The sulfur is converted to hydrogen sulfide and may be eliminated by vaporization from the liquid treated. Pilot-plant data show stocks containing up to 4.5-5.0 per cent sulfur may be desulfurized successfully by the method, which reduces the sulfur to less than 0.1 per cent for light products, and to about 0.5 per cent for heavy fractions such as lubricating-oil type cuts. These data were obtained chiefly by treatment of those fractions obtained by coking Santa Maria (California) crude; the report shows the effects of temperature, pressure, space velocity, hydrogen-recycle ratio, and of H_2S in the recycle gas on the reaction results.

Synthetic hydrocarbon chemistry continues to absorb much interest, as in the cracking of ethane and propane for the production of ethylene. These waste gases are good raw material for making ethylene as a synthesis intermediate for many products in the chemical engineering field, H. C. Schutt of Stone & Webster Engineering Corp., stated. Schutt discussed the application of chemical engineering principles to cracking-coil design and operation.

One major use of ethylene is in the manufacture of synthetic-ethyl alcohol, said C. M. Beamer of Standard Oil Development Co. Ethylene from cracking of ethane, propane, or of heavier refinery materials is absorbed in strong sulfuric acid under such controlled conditions as to form mixed sulfates. These organic sulfates are hydrolyzed with water and steam, and the raw alcohols and by-products are stripped from the diluted acid, purified by redistillation and extraction. The main by-product is diethyl ether, and both products are made to a high standard of purity in this process.

Adaptation of U.O.P. polymerization units to the synthesis of isopropylbenzene, or cumene, valuable as a high-octane blending agent for aviation fuels during the was was easy, S. H. McAllister and colleagues said in discussing Shell Oil Co.'s cumene-alkylation process. With a phosphoric acid-on-kieselguhr catalyst, in one instance a sulfuric-acid catalyst, great quantities of this product were made, and can be employed as blending material for peacetime fuels.

Production of Allyl Alcohol

Allyl alcohol, important in synthetic organic chemical processes, is produced commercially by hydrolyzing allyl chloride by means of sodium hydroxide. Yields of the alcohol greater than 90 per cent of the theoretical are obtained when properly controlling the variables of temperature, contact time, alkali, and pH strengths, the chloride being converted almost quantitatively and the main by-product being diallyl ether, a side reaction somewhat analogous to the formation of diethyl ether in the synthesis of ethyl alcohol with sulfuric-acid catalyst. The allyl alcohol is purified by azeotropic distillation to remove water and diallyl ether as lighter materials, and a small proportion of heavy bottoms. Because of importance in organic synthesis, C. F. Oldershaw and his collaborators, of Dow Chemical Co., showed how HCl is recovered and purified by absorption in (1) water-cooled packed towers, (2) in adiabatic packed towers, (3) stripping free chlorine from the 32 per cent HCl solution by air and by steam, leaving a strong acid solution containing less than 20 parts per million of free chlorine.

Other papers included that by N. K. Chaney and others, of United Gas Improvement Co., who discussed high-temperature control methods, as for example, in carrying out the Ugite process for deep cracking of petroleum and gas fractions to form olefins, aromatics, diolefins, tars, etc. Testing corrosion effects via laboratory methods was discussed in detail by A. Wachter and R. S. Treseder, of Shell Development Co.; F. L. LaQue and W. Z. Friend, of International Nickel Co., pointed out that even though corrosion studies are made prior to building chemical plants corrosion still occurs, because some conditions present in the commercial operation were not considered in the tests.

Officials Discuss Plans For New Oil Bureau

WICHITA FALLS, Tex.—Plans for setting up a Bureau of Mines office here to cooperate with the North Texas Oil & Gas Association and producers in the area on problems involved in secondary recovery operations, were discussed in a meeting between R. A. Cattell, chief of the petroleum and natural gas division of the Bureau of Mines, and representative oil and gas operators, held here last week.

The bureau recently completed a report of a study made some time ago covering the history of water flooding of oil sands in North Texas, and it is expected the addition of a bureau office in Wichita Falls will stimulate more activity in similar operations.

A. I. M. E. Group Discusses Engine, Fuel Selection

DOWNEY, Calif. — At the recent meeting of the Southern California Section of the Junior American Institute of Mining and Metallurgical Engineers, discussions included selection of engines and fuel for hoists, pumping engines, and maintenance.

The meeting brought out the merits of exchanging engines, rather than making repairs in the field. Maintenance of two-cycle engines was considered less than conventional four-cycle engines, but fuel and oil consumption is relatively high if the engines are not loaded to capacity. The meeting concluded with a discussion on the possibility of using surplus aircraft engines for power on hoists.

THIS 1946 WEEK

S	M	T	W	T	F	S

REFINING—Cracking unit placed in operation at Shell Oil Co., Inc., Houston refinery uses newly developed microspheroidal catalyst, . . . ¶U. S. technical experts leave to study German developments in use of oxygen in synthesis of liquid hydrocarbons. . . . ¶Baton Rouge refinery of Standard Oil Co. of New Jersey processes billionth barrel of crude. . . . Company to spend several million dollars for plant improvements. . . . ¶Gulf Coast independent refiners cut crude runs to stills from 94 to 72 per cent of operating capacity. . . .

PRICES—Pennsylvania Grade crude raised 6 cents, to $3.41 effective September 1. . . . New posted price does not include revised subsidy rate of 50 cents per barrel. . . . ¶Tank-wagon gasoline up 1/2 cent in middle western area affecting 11 states. . . . First general increase since July 30. . . . ¶Demand, in general, good. . . . Markets strong. . . . Heavy crop yields and fall harvest tend to pick up farm requirements for petroleum products. . . . ¶Mid-Continent refinery gasoline up 1/8 cent. . . . Regular grade now 6 7/8 to 7 cents. . . . ¶Show down anticipated between American made synthetic rubber and imported natural rubber. . . . Intensive development of synthetic makes laboratory product cheaper than imported natural rubber. . . .

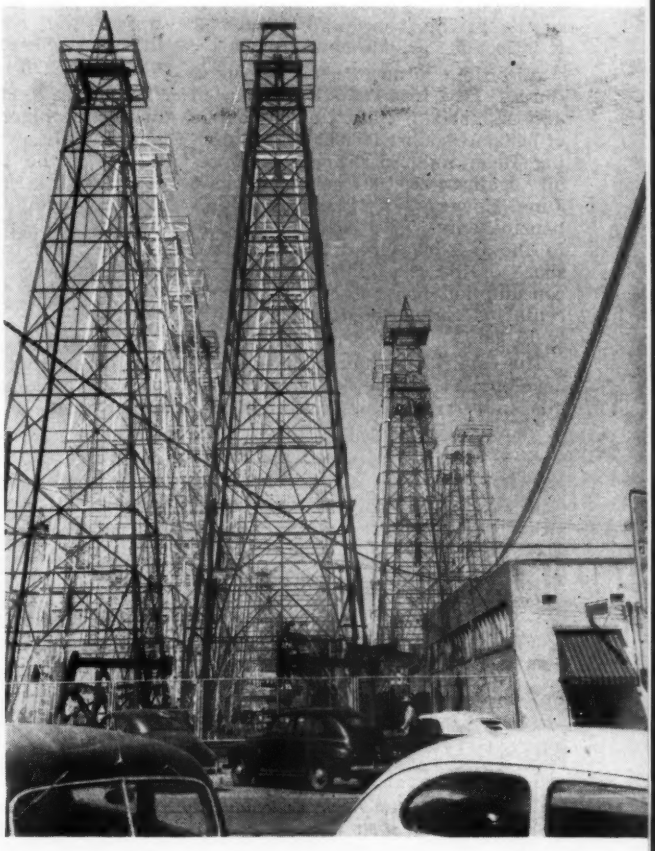
INTERNATIONAL—Office of International Trade reports present quota of American businessmen visiting occupied Germany limited to 95 per month. . . . Enterprise must produce goods or services essential to military government. . . . German civilian needs. . . . Exportable commodities or that which reduces German imports. . . . Business communications prohibited. . . . ¶Italian interests look to Russia and Mexico for additional supplies of oil and petroleum products to meet country's expanding demands. . . . Funds provided for Czechoslovakia oil exploration. . . . ¶Fuel-oil quota from eastern Alberta heavy crude fields tripled. . . . ¶Rival Middle East companies show way to international cooperation. . . .

PRODUCTION—Reconversion Director John W. Steelman's order cutting stripper well subsidies by 25 cents as of August 1. . . . Will eliminate subsidy entirely in pools where payment was 25 cents or less. . . . In North Texas alone order affects 16,000 wells producing 40,000 bbl. daily. . . . Pennsylvania Grade crude subsidy cut to 50 cents. . . . ¶U. S. output in August 31 week gained 4,868 bbl., to 4,852,777 bbl. daily. . . . ¶Well completions up 27, to total of 604 in the same week, from 577 previous week. . . .

TRANSPORTATION—Shell Pipe Line Co. to spend $1,700,000 reconditioning Texas and Oklahoma pipe-line systems. . . . ¶Atlantic Pipe Line Co. replaces Texas Pipe Line Co. as part owner of Bayou Pipe Line system. . . .

DRILLING—Mississippi Oil and Gas Board turns down operators' request for change from 320 to 640-acre gas-well spacing in Gwinville field, Jeff Davis County. . . . ¶Increasing number of well locations indicates surge in California drilling activity. . . .

WASHINGTON—Hurried departure for Paris of State Department's petroleum division chief may be omen that oil problems are arising in drafting of European peace treaties. . . . ¶Warning given entire world faces chronic shortage of crude oil. . . . ¶Opposition expressed against long-range foreign oil policy at this time. . . .



This city block in the heart of Kilgore, Tex., is considered one of the most densely drilled spots in the world. Despite the fact that 24 wells are crowded within the block, nearly one-half of it still is occupied by business houses fronting on Kilgore's main street. The well shown at the front of the second row from the right is the George & Wrather Drilling Co. et al., Mrs. J. E. Adams, located in the center of Block 120 of the townsite of the Gregg County city. This recent completion came in flowing at the rate of 20 bbl. per hour

International

WORLD-WIDE OIL DEVELOPMENTS

Italian Interests Negotiating for Oil Products From Mexico, Russia

by Antonio Giordano

MILAN, Italy.—The question of the supply of oil and petroleum products to Italy continues to attract the attention of the Italian business world especially in view of the fact that the bulk of the oil and petroleum products imported through the UNRRA—the only supply coming to this country at present—goes to government departments and other governmental organizations so that when it comes to the private consumption most of it is lost for private consumption.

According to an official statement, during July 1946, UNRRA imported and assigned to Italy 191,350 centals of benzine against 186,081 centals during June, and 285,000 centals of gas oil against 260,000 centals during June. However, of 186,081 centals of benzine only 37,700 centals has gone to the free car-circulation, and the share of the gas oil for the private consumption has not exceeded 5,000 centals (1 cental equals approximately 15 gal.).

This state of affairs hinders the development of the Italian automobile industry as prospective buyers of cars and trucks refrain from purchases, not having the necessary fuel for their vehicles. This explains why especially Fiat is in the market to negotiate both with Russia and with Mexico the sale of their products against oil and petroleum products. It should be considered that Fiat was interested before the war in the Petrolea Co. with a refinery in Vado Ligure (Savona) together with the Russian Neft syndicate, and that after the war it has acquired a share of the Aquila Oil refinery in Trieste.

Fiat has a large stock of marine diesel machinery which cannot be sold in Italy owing to the critical situation of the Italian merchant marine, and it is exactly such stock that they are trying to exploit in the negotiations with Russia in addition to the cars and trucks which the Russian commercial mission, which recently visited Turin, would like to purchase.

In regard to Mexico, it should be considered that recently representatives of the Mexican Government Oil Department have visited Italy in connection with the liquidation of the accounts for the construction of the three 9,000-ton motor tankers ordered in 1939 from Ansaldo Shipbuilding Co. and which have not been delivered in consequence of the outbreak of the war. The vessels should have been fitted with Fiat engines, and this has led to new negotiations between Italy and Mexico which has made inquiries as to the possibility of using the Italian oil refineries to work the heavy oils for the distribution of refined products under Mexican trade-mark to Mediterranean markets.

It remains to be seen what decision will be taken by the Allied Commission in Rome when the question of such negotiations is submitted to them, but there is no doubt that both Russia and Mexico have laid their eyes upon the prospects of establishing in Italy the basis for their oil business with Mediterranean countries, exploiting the difficulties of the Italian home market for the supply of fuel for road transports.

Italian Resources Probed

At the same time efforts are being made to develop the oil resources in Italy itself. Oil resources in Italy included the Parma district oil wells having an average output of 1,000 tons monthly (about 7,650 bbl.). They were slightly damaged during the war but are to be fully in operation in the next 2 or 3 months. Other Italian resources are the Ripi (Rome) wells with an output of 180 tons monthly (about 1,380 bbl.). These were destroyed by the Germans after the fall of Cassino, but are being repaired at present by the Azienda Generale Italiana Petroli. Recently, oil has been discovered also in the Piacenza and in the Lodi district, and it is reported that the Azienda Generale Italiana Petroli has secured the support of Standard Oil Co. (N. J.) to carry out development in these zones and drilling with rotary machinery capable of reaching 4,000 meters (about 13,100 ft.).

In connection with the latter developments it is reported that a Swiss geologist who has been watching the Italian situation on behalf of Standard of New Jersey returned recently from a trip to the United States with

The refinery of Societe Anonyme Benzina Italiana at Naples. The plant is built near the foot of Mt. Vesuvius. Photo courtesy of Foster-Wheeler Corp.

instructions to continue investigation of the matter. The reports of the American interest in Italian oil development also have brought to Italy a representative of the Shell group. It has been known that in addition to Standard Oil experts there are also in Italy representatives of Gulf Oil Co.

It is reported that in view of the interest of foreign oil companies the Italian Government is studying the question of a new Italian oil policy to be followed within the provisions of the Peace Treaty. According to the latest information from Rome it would appear that such policy is to be based:

1. On concessions to be given by the Italian Government to foreign oil companies for exploration and exploitation of the eventual oil resources in Italy against a compensation in gold currency, and with the understanding that joint Italo-foreign companies are to be formed with 51 per cent of the capital in Italian hands and 49 per cent in foreign hands for the exploitation work.

2. Fiscal facilities are to be granted for the operation of these concerns and free import is to be granted for all the machinery, fittings, etc., necessary for exploration and drilling.

3. Instead of importing refined petroleum products, an import duty should be collected on such products to encourage refining in Italy, and for such purpose should be granted also the free imports of machinery, fittings, etc., to build new refineries.

4. Refineries in Italy are to work within the free-zone regime, viz., goods could be imported and exported within their territory without being submitted to Italian customs regulations, payment of duties, etc.

5. A premium should be granted to the transit of petroleum products through the Italian territory en route to Central Europe or the Balkans, and the Italian State Railways should adopt a special reduced railway tariff on shipments of oil and petroleum products from the Italian ports to the Italian frontier stations.

In connection with the question of transit of oil and petroleum products through Italy, it is reported that the Italian Government will advance through the Instituto Mobiliare Italiano (I.M.I.) the necessary funds for reconstruction of destroyed or damaged coastal terminals pending settlement of the question of war damages.

It also is reported that during the last meeting of the shareholders of Aquila Oil Refining Co. in Trieste in which in addition to the interests of the Fiat were represented also British interests, Italian shipping interests and Italian sugar-industry interests, consideration was given to construction of coastal terminals in Venice, Ravenna, Ancona, and Bari, and the connection of the Ravenna plants with inland waterways up to Mantova where the underground plants of the Azienda Generale Italiana Petroli have again been placed into operation. In such a way it will be possible, it is stated, to face the shortage of tanker trucks for the distribution of oil in northern Italy.

In connection with the question of transit of oil and petroleum products through Italian ports, it is significant that Gondrand Freight Forwarding Co. has again taken up the question of construction of a pipe line from Genoa to Lugano where it may erect a refinery with a capacity of 500,000 tons yearly for the supply of petroleum products to the Swiss market without using railways or river transports.

Romania Charged With Using U. S. and British Oil To Pay Reparations

PARIS.—The subject of oil was officially brought to the attention of delegates to the peace conference here when South African and British representatives charged that Romania was meeting Soviet reparations with oil which legally belongs to United States and British private interests. This accusation was made during the debate on the Danubian Countries and Finland.

Oil companies directly concerned are receiving less than 50 per cent of sales profits under the deal whereby Russia, directly or indirectly, is the beneficiary, according to the charge. Moreover, as Romania's exportable surplus is fixed below so-called world prices, Russia is responsible for making other Allied interests bear the brunt of Romania's oil reparations to the Soviet.

In defense, the Russian delegate challenged Britain to define a "fair world oil price," adding that there was no such thing and citing various prices at numerous world ports which indicated that oil might be subject to "rigging." He said any attempt to interfere with Romania's right to uphold any price she considers fair would constitute an infringement on the sovereignty of Romania.

Romania's 1945 crude production was approximately 32,000,000 bbl. compared with 24,000,000 bbl. during 1944.

Oil Bill Drafted for Unification, Exploration

COLOMBIA. — Drafting of an oil bill designed to promote Colombian oil exploration and to unify oil legislation among Ecuador, Colombia, and Venezuela, was said to be under consideration of Dr. Luis Buenahora, Minister of Petroleum.

A meeting is expected to be held at Bogota, in the near future, by the three-member committee appointed by the ministry to study existing oil legislation, protection of the industry, fiscal revenues derived from oil, concession terms, and exploitation regulations. Committee members are Dr. Silvano Uribe, chief of the technical section; Dr. Mario Escobar, chief oil lawyer, and Dr. Eduardo Galvez, secretary of Oil Affairs. The Venezuelan Government was reported to have appointed a similar committee.

South American Oil Congress Set for Lima

WASHINGTON.—U. S. Army and Navy officials will attend the Oil Congress which will take place at Lima, Peru, early in March 1947. The congress, organized by Instituto Sudamericano del Petroleo, also will receive delegates from the American Petroleum Institute as well as a number from different Latin American Governments.

South Africa Studies Shale Oil

JOHANNESBURG, South Africa.—Plans for large-scale production of oil from shale deposits here are reported to be under way. South Africa's 1945 coal production totaled 25,000,000 tons, and of this 4,500,000 tons was rexported. Coal prices in this area are said to be relatively cheap.

New Arrangements Made For Philippine Exploration

LOS ANGELES. — Additional arrangements for resuming exploration in the Philippine Islands are being made by Transamerica Corp., Los Angeles, which is participating in the program through two subsidiaries, Occidental Corp. and Capital Co.

Occidental Corp., headed by E. D. Woodruff, Los Angeles, has acquired an interest in the Far East Development Co., Inc., a Philippine corporation holding two concessions validated for a term of years by the Island's petroleum act of 1937. Col. Andreas Soriano, president of the Far East Development Co., plans to resume work on the concessions which cover approximately 70,000 acres in the northern part of Cebu and on Bondoc Peninsula on the southwestern tip if Luzon. Capital Co., also headed by Woodruff, plans to assign personnel and provide exploratory equipment as part of the consideration for its interest in Far East Development.

A view of the American and Arabian communities at Dhahran and part of the Dammam producing field in Arabian American Oil Co.'s Saudi Arabian concession. Homes of American employes, dining hall, sports facilities, movie theater, recreation hall, and swimming pool are in the foreground. Center are offices, machine shops, garages, power plant, and other facilities. The stabilizing plant is near the center. The village built for Arab workmen is at upper center

Rival Middle East Oil Companies Show Way To International Cooperation

by Lester S. Thompson

This second of two articles by Lester S. Thompson, geologist with a number of years experience in the Middle East oil area, deals with the history and development of concessions in Middle East countries other than Iran. Iranian concession history was discussed in the first article which appeared with a map of the area in The Oil and Gas Journal, August 31, Pages 60-63.

THE record of acquisition of oil concessions in the territories of Iran's neighbors to the west and south does not present the same interesting historical picture as that showing the evolution of the modern oil concession in Iran. Every oil concession valid today in the Middle East was hatched full-fledged and in most modern plumage, speaking from the standpoint of the local governments. This is understandable when one considers that they are all the product of the period following World War 1. In fact, if one excepts the concession of the Iraq Petroleum Co. proper, in northeastern Iraq, all date from the 1930's. By that time, new governments had been firmly set up. Ideas on what the terms of oil concessions should be had progressed a long way since the days of William Knox D'Arcy. However much one may accuse these new governments of being inspired, one must admit that they were not slow to recognize a good thing. With the record of the Anglo-Iranian before them, it was only natural to raise the price to what the traffic would bear. In some cases, this may have been justified; but the probability is that all parties would have benefited if high royalties and high penalties could have been arranged on a sliding scale rather than imposed on the new enterprise from the start. It is not beyond reason to assume that some of the later concessions would never have been taken up if it had not been for competitive bidding by certain undesirable powers. Once a precedent is established, however, it is hard to break. Whether the cause was a claim for just compensation to the country, greed on the part of governments or competitive bidding, or whether it was a combination of all three, the result is the same—heavy down payments, high royalties, and large guaranteed minimum royalties, such as $800,000 a year or more.

Historically, concessions were obtained in what is now the Kingdom of Iraq prior to World War 1. The negotiations of the Anglo-Iranian in connection with their developments at Naft Khaneh have been mentioned. In 1911, the African and Eastern Concessions, Ltd., a British company, was organized to take up an oil concession covering Iraq north of the Thirty-third Parallel and east of the Tigris River. The following year, the name was changed to the Turkish Petroleum Co., Ltd. Little work was done until after World War I. With the change of government from Ottoman Empire to a mandated territory with the promise of establishing it as an independent Arab kingdom, the old contract was scrapped. In the meantime, nationals of other powers became interested. The Turkish Petroleum Co. was reorganized. Participation and Investments, Ltd. (the Gulbenkian interests) retained 5 per cent of the company. The remaining 95 per cent was divided equally among the Anglo-Iranian, the Anglo-Saxon Petroleum Co., Ltd. (Shell), the Standard Oil Co. (N. J.) (later replaced by Standard-Vacuum) and Cie. Francaise des Pétroles. After considerable negotiation, the new Iraqi Government signed a concession contract with the reorganized company in 1925 granting it the oil rights in the original area for a period of 75 years. In 1929, the company changed

its name to the present form—Iraq Petroleum Co., Ltd.

The great Kirkuk anticline was discovered in 1927, but commercial production was held up until 1934 pending construction of the pipe lines to the Mediterranean. Since that date, production has been maintained at 80,000 to 90,000 bbl. per day except when the Mediterranean was closed during the war period (1940-44) when it fell to about half that amount. Cumulative production from Kirkuk to the end of 1945 was nearly 300,000,000 bbl. The ultimate reserve is estimated at about 3,000,000,000 bbl.

Another large structure was drilled in at Ain Zalah near the Turkish border in 1940. To date, there has been no commercial production. No other fields have yet been discovered in this concession area although the possibilities are considered good.

Two I.P.C. Pipe-Line Systems

To handle the oil from Kirkuk, the Iraq Petroleum Co. constructed two pipe-line systems—one to Haifa, Palestine (621 miles), the other to Tripoli, Lebanon (523 miles). Each consists of a 12-in. line paralleled by a 10-in. A new 16-in. line paralleling the existing systems is now under construction. When completed, the total capacity of the combined lines will be 300,000 bbl. per day as against the 90,000 now transported.

Consolidated Refineries, Ltd., (Anglo-Iranian and Anglo-Saxon) completed a refinery in Haifa in 1940. With recent additions, the present daily capacity is 90,000 bbl.

Iraq Petroleum Co., through a subsidiary known as British Oil Development, Ltd., (B.O.D.) acquired the oil rights in an old German concession in northern Iraq west of the Tigris River. A new contract was negotiated and signed in 1938 for a period of 75 years. Oil has been found in the Qaiyarah area about 30 miles south of Mosul. There has been no commercial production to date.

Through another subsidiary, Basrah Petroleum Co., Ltd., a concession was obtained covering Iraq south of the Thirty-third Parallel. This was signed in 1938 and is for a period of 75 years. Through these three concessions, the Iraq Petroleum Co. holds the oil rights over the entire Kingdom of Iraq except for the small area around Naft Khaneh. The drilling program was held in abeyance during the war but is expected to be initiated shortly.

Activities of I.P.C. Outside Iraq

The Iraq Petroleum group organized a company known as Petroleum Concessions, Ltd., which, through a host of subsidiaries called "Petroleum Development (Name of Country) Ltd.," has obtained concessions covering practically every kingdom, sheikdom, mandate and protectorate in the Middle East except Saudi Arabia, Bahrein, Kuwait and, naturally, Iran.

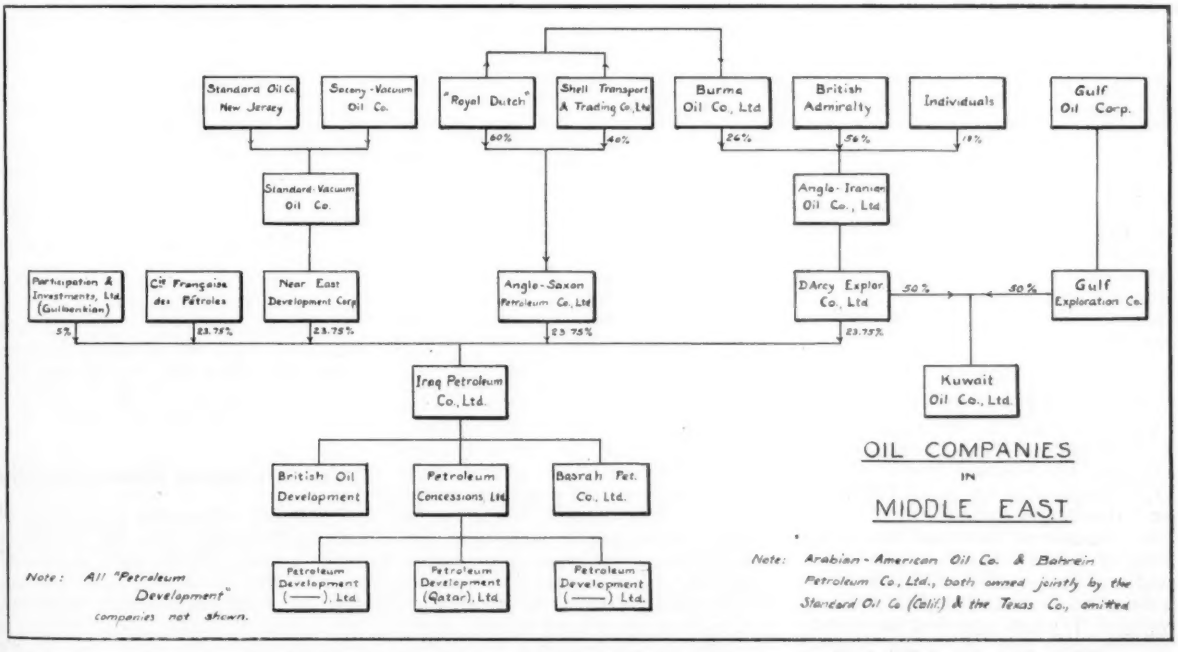
To the present, drilling has been carried on only in the Qatar Peninsula. Oil was discovered at Dukhan in 1940, but the wells were destroyed shortly after for strategic reasons. Drilling was resumed in 1945. The proved reserves are estimated at 500,000,000 bbl. The concession held by Petroleum Development (Qatar), Ltd., was granted in 1935 for a period of 75 years.

International

Chronologically, after the development of Kirkuk by the Iraq Petroleum Co., the next great move in the Middle East was made by the Standard Oil Co. of California when they discovered oil on Bahrein Island in 1932. Their entry into Bahrein was noteworthy in view of the fact that a concession covering that island had already been held by the Anglo-Iranian Oil Co. and relinquished on geological grounds. The Bahrein Petroleum Co., Ltd., was organized with the Standard of California sole owner. In 1936, The Texas Co. acquired a 50 per cent interest in this company. The concession, in its present form, is for a period of 55 years beginning in 1940. Production has been maintained at about 20,000 bbl. per day. Cumulative production to the end of 1945 was slightly more than 71,000,000 bbl. Proved reserves are about 250,000,000 bbl. The company constructed a 30,000-bbl. per day refinery which recently has been increased to double that capacity. The refinery is supplied in part from Damman field on the Arabian mainland 34 miles away through a 12-in. pipe line.

Saudi Arabia

The same group (Standard Oil Co. of California and The Texas Co.) own the Arabian American Oil Co. which holds a concession of more than 250,000 square miles extent in Saudi Arabia. There are actually two conces-



An organization chart showing participants in various Middle East producing companies

sions. The first is for 60 years dating from 1933. The other is one of preferential rights extending for 60 years from 1939. The company has so far brought in four fields along a 150-mile stretch near the shore of the Persian Gulf. Production is now approximately 180,000 bbl. per day. Previous figures mean little because, like several other developments in this general region, production suffered resumed this year. Proved reserves are estimated at 4,000,000,000 bbl. with a possible potential of more than double that figure.

Conclusion

This completes the story of oil concessions in the Middle East from their crude beginnings in 1901 when only one country and one concession was involved and the terms were very liberal, down to the present day when, with the exception of southeastern Iran, every bit of prospective oil land has been taken up by one company or another. Even in such a cursory description as the foregoing for lack of outlet during war years. Reserves are estimated at something between 2,000,000,000 and 4,000,000,000 bbl. A refinery has recently been completed at Ras at Tanura. It is now processing between 85,000 and 90,000 bbl. per day. It is connected with the three southern oil fields through a system of 12-in. pipe lines.

Kuwait

The last of the Middle Eastern concessions in active operation at the present time is that of the Kuwait Oil Co., Ltd., owned jointly by the Gulf Exploration Co. (Gulf Oil Corp.) and the Anglo-Iranian Oil Co., Ltd. The concession includes the entire area of Kuwait (6,000 square miles) and runs for a period of 75 years from 1934. The field at Burghan was developed 7 years ago, but work was discontinued and the wells plugged during the war. Operations have been account, certain obvious facts strike the eye. Among the more striking of these is the composition of the various groups which make up the producing companies. Here one finds rival commercial interests and even rival national interests getting along together amicably. Space does not permit a digression into the subject of the economics and politics of Middle Eastern oil. Nevertheless, it is apparent that, with a limited market and practically unlimited reserves, production must be carefully prorated. Without strict governmental control, such proration can be accomplished only through mutual agreement. Thus, while statesmen and legislators, committees and delegations discuss and argue the question of oil pacts and cartels, the oil companies themselves have quietly shown the way to international cooperation in the Middle East.

TOTAL AREA OF OIL CONCESSIONS—DIVISION OF NATIONAL OWNERSHIP OR CONTROL (SQUARE MILES)

Country—	Total area of concessions	American control	British control	Dutch control	French control
Iran*	100,000	.....	100,000	(†)	.....
Iraq	140,000	33,000	42,000	24,000	33,000
Palestine	10,000	2,380	3,000	1,720	2,380
Syria	37,000	8,800	11,000	6,600	8,800
Transjordan	30,000	7,100	9,000	5,200	7,100
Oman, etc.	100,000	23,750	30,000	17,250	23,750
Kuwait	6,000	3,000	3,000	(†)	.....
Saudi Arabia	250,000	250,000	.....	.....	.....
Bahrein	250	250	.....	.....	.....
Total‡	673,250	328,280	198,000	54,770	73,030
Per cent	100	49	30	8	11

*Russian concession of 100,000 square miles in northern Iran omitted. †Minority interest through 26 per cent participation in Anglo-Iranian by Burma Oil Co., Ltd., included in British total. ‡Segregated totals incomplete because of omission of Gulbenkian holdings of 5 per cent of Iraq Petroleum group.

Note: The word, control, refers to proportional participation, not to individual ownership of any specific area.

ESTIMATED PROVED RESERVES—DISTRIBUTION OF NATIONAL OWNERSHIP OR CONTROL (1,000,000 BBL.)

Country—	Total proved reserves	American control	British control	Dutch control	French control
Iran	5,000	.....	5,000	(*)	.....
Iraq and Qatar	5,000	1,200	1,500	900	1,200
Kuwait	4,000	2,000	2,000	(*)	.....
Saudi Arabia and Bahrein	4,000	4,000	.....	.....	.....
Total†	18,000	7,200	8,500	900	1,200
Per cent	100	40	47	5	6.7

*Minority interest through 26 per cent participation in Anglo-Iranian by Burma Oil Co., Ltd., included in British total. Purely British ownership in Anglo-Iranian is further diluted in that part of the 18 per cent of shares held by individuals is in hands of Iranian nationals. †Segregated totals incomplete because of omission of Gulbenkian holdings of 5 per cent of Iraq Petroleum group.

Turkish Government Plans For Oil Search Proceeding

The Turkish Government is proceeding with its plans for a widespread oil exploration program in the country. George E. Failing Supply Co., Enid, Okla., has already shipped 5 of the 11 drilling units which it has a contract to supply in connection with the work.

The exploration program is being carried out under the direction of the Turkish Mining, Research and Exploration Institute. In addition to the oil exploration, some of the equipment will be used in a search for other mineral deposits and for drilling water wells for irrigation.

H. V. Hueppelsheuser, Failing employe, has been sent to Turkey to supervise the work and to instruct Turks in operation of the equipment. Turkey at present has no commercial production, although some drilling was carried out 10 years ago near the Bosporus, and other exploration work has been conducted.

Russians Use Bacteriological Analysis in Oil Exploration

MOSCOW.—Using a new oil prospecting method, described as "a bacteriological analysis of subsurface soils," Russian scientists have discovered an important gas field, at a depth of 628 ft., near the village of Mikhailovsky, according to press reports here. The method is said to be equally effective for uncovering crude-oil deposits though none utilizing this method has been reported to date.

In studying subsurface soils over petroleum and gas deposits, it was found that certain so-called hydrocarbon bacteria are invariably present. The minute quantities of combustible gases seeping through to the upper layer of the earth from such deposits, provide the nutritive medium, it is stated. Since the bacteria are not found in the soil or localities where there is no gas or oil, their presence may be regarded as a definite indication of gas or oil in that area.

While Russian scientists reportedly worked on this discovery method before the war, additional research was cancelled until the end of hostilities when an expedition was fitted out to prospect for gas in the Stravropol region in the North Caucasus.

Lobitos Output Rises Slightly

LONDON.—Peruvian production of Lobitos Oilfields, Ltd., for month of June totaled 168,000 bbl., compared with 167,000 for April. June production of Anglo-Ecuadorian Oilfields, Ltd., totaled 126,000 bbl. which is approximately the same as April's production.

What Others Say

Opportunities for the Use of Small Aircraft in Venezuela

AIR transport systems in Venezuela have arrived at a fairly high stage of development in the medium and large-plane class, and oil companies maintain their own fleets of planes in addition to wide use of commercial lines on scheduled and chartered flights. The value of such air transport in oil-field operations has been fully demonstrated, and there is now some movement toward the employment of smaller planes in local operations. It is in this latter field of aviation that the opportunities for the economical use of aircraft in Venezuela now appear the greatest.

The Venezuelan Government is encouraging the development of civil aviation, and the climate of the country, having no extremes of temperature or radical wind variations, is favorable to year-round flying. There are a considerable number of good airports throughout the country, and generally it is no problem to smooth off an airstrip at a wildcat well, field party location, company camp, and any other form of field operation. The aviation laws of the country compare favorably with those of the United States, and pilot qualification requirements and controls are also similar. Therefore, there are no real, obstacles to immediate development and extension of air transport systems in the small-plane class.

Use of Small Planes Discussed

There appear to be a number of ways in which small planes can be used by the oil companies to good advantage. Some of these are listed and discussed below.

1. **Field management.**—The division and district managers ordinarily spend much of their time visiting operations if they maintain the desired contact. However, bad roads, or no roads, often discourage frequest visits, and either the company suffers from lack of contact or the manager wears himself out traveling. With small airstrips at all operations and a small plane at the command of the manager, contacts can be made frequently and easily.

2. **Supervision.**—This includes field superintendents, tool pushers, petroleum engineers, construction engineers, subsurface geologists, geophysical supervisors, field survey engineers, and transportation foremen. Such men are normally required to do a large amount of traveling, and their effective working time is greatly reduced thereby. Five small airplanes for the use of 10 to 15 such supervisors can easily increase working time to the extent of eliminating four or five employes required under present conditions.

For example, one subsurface geologist with an airplane can do the well-site work on two or three widely scattered wildcat wells, thereby eliminating two geologists or employing them otherwise. The saving in salaries amount to $14,000 per year or more—perhaps more than the operating cost of the plane. Likewise two petroleum engineers with a plane can do the work of three men without a plane, and so on up and down the list.

Planes Minimize Shutdown Time

3. **Geophysical party chiefs.**—A small airplane assigned to the field party chief will likely pay for itself each year. It has been demonstrated that small planes can improve party efficiency by minimizing shutdown time. On one occasion, 30 minues of scouting in a small plane caused the party chief to relocate seismograph lines in such a way as to avoid 4 days of shutdown time. At the rate of at least $1,000 per day for a seismograph party in Venezuela, this meant an immediate and direct saving of $4,000. Accidents to personnel and equipment, emergency repairs, prompt handling of labor and medical affairs, and many other details of field operations may often be attended more economically if a small airplane is available.

4. **Field party technical personnel transport.**—It appears that small airplanes can be used to advantage in the daily transport of technical personnel to and from the field. For example, a field camp for the technical men on a seismograph party costs around $40,000 per year. Two small airplans carrying a total of four to six men can be operated a year for less than this amount, and by their use the men can be given good accommodations in towns or company base camps with their families. The increase in party efficiency by providing married status for field men and thereby maintaining a staff of experienced personnel means a saving in final costs which is considerable but not easily measured.

The term "small plane" as used herein means any airplane of comparable low horsepower with capacity up to four people which can be delivered in Venezuela for less than $10,000. There is a wide choice in this class of aircraft, and the proper type may be obtained for any given job.

Pilots to Be Company Employes

The above suggestions for the application of small airplanes assume that company employes will fly the plans in more or less the same manner that they now drive automobiles. We can hardly get around the fact that the most economical use of small airplanes depends on the companies having employes flying company planes; and to reap immediate benefits from the use of planes it appears that present employes must be given pilot training. This is not a serious problem, because both planes and instructors are available and a poll of employes will probably show that 50 per cent are ready to start their training immediately.

There are perhaps several ways in which training can be given field employes, but it seems that company-operated schools or company-sponsored flying clubs at field base camps are the best approach. In the former case, the company can operate at a cost of approximately $11 per flying hour. This cost includes an instructor-mechanic, two T-hangers, a small repair shop, and two airplanes flown a total of 1,000 hours each per year. The company can make the planes and instruction available to all employes and their families, charging $6 per hour to the employe personnel account and paying the remaining $5, and in the long run make it a paying proposition. For instance, at a cost of $10,000 per year, at least 10 employe pilots would be trained to replace say three full-time commercial pilots. Eliminating the commercial pilots means a saving of about $18,000 per year—$8,000 more than the cost of employe pilot training. In the latter case, a properly organized club with company support can accomplish the same result.

Only 100 Hours Flying Time Needed

The use of small planes extensively in the company-transport system, of course, implies that company planes will be flown by employes holding private licenses with as few as 100 flying hours. This represents approximately twice the amount of experience required for private licenses by government regulatory and governing agencies, and is double insurance that the planes will be flown safely.

However, there are still some company officials who maintain that this standard is too low and that a pilot cannot fly safely unless he holds a commercial license and around 500 hours of flying experience. They seem to overlook the fact that there is a considerable difference between flying transport planes and flying small personal planes.

The facts do not sustain the objections; and the opportunities for improved field operations through the use of small planes are many and immediate for the company that is willing to take the step into small-plane operations. It appears entirely likely that a fleet of small planes may be operated without any increase in present company operating costs, and the indirect savings through personnel reductions and improved efficiency should be considerable. In the minds of many of us it seems almost certain that ample financial reward awaits the company or companies who use small planes on a wide scale.

Helicopters, once they are developed to the practical stage of present small airplanes, will undoubtedly replace the conventional plane in many local operations;

(Continued on page 69)

The material carried on this page was received with the following letter:
Editor, The Oil and Gas Journal.
Dear Sir:

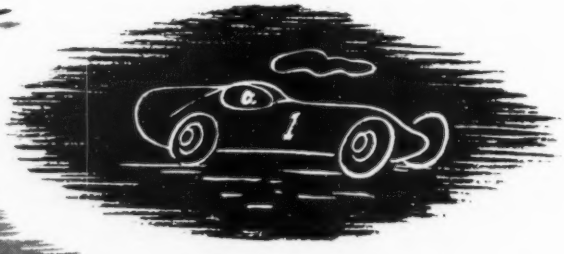
I was interested in your Aviation Section of the June 22 issue of the Journal, and I am glad to see that you are beginning to acquaint the oil industry with the possibilities of aviation in oil-field operations. Personally, I feel that the oil industry is a bit slow in accepting airplanes as a useful tool; and when we think about it, this is a bit surprising in an industry which has had such a big part in aviation's development.

The application of small airplanes to local field operations is one of my pet projects—particularly in Venezuela—and I am submitting my thoughts on the subject for your consideration. You can use them as you see fit. My object is solely the promotion of the idea of utilizing small planes in oil company work. I have no literary ambitions. Yours very truly,

H. R. MOORMAN,
Chief geophysicist, Socony-Vacuum Oil Co. of Venezuela, Apartado 246, Caracas.

Polymerization

to meet higher octane gasoline requirements



WASHINGTON WATCHING

BY HENRY D. RALPH

Oil Troubling Peace Makers?

WASHINGTON. — The sudden departure for Paris of John A. Loftus, chief of the State Department's petroleum division, has aroused speculation that petroleum problems may have arisen in connection with drafting European peace treaties or that Loftus may have been called to consult with Secretary Byrnes and other high State Department official regarding his recent public suggestions that the United Nations should take control of all international oil transactions.

In view of the fact that most of our foreign-policy-making officials are likely to be occupied at the Paris peace conference for some time, it is not improbable that Loftus may have been called there to consult on long-range petroleum policies along the lines he suggested in a Pittsburgh speech and later in a nation-wide broadcast.

Loftus' suggestions for a multilateral oil treaty to be administered by the UN, with power to review and modify private contracts and concessions, is generally viewed as a trial balloon, sent up to test the winds, both domestic and international, in preparation for some move not yet revealed. If so, the petroleum-division chief should have considerable meteorological data to report to his superiors.

It is reliably understood that the British Government is definitely hostile to the idea of a United Nations oil-control body, and a great many American oil-company executives have openly denounced the suggestion. All the winds seem to be buffeting the Loftus balloon.

Big Inch Bidding

WAR Assets Administration is nearing the final stage in its analysis of the 16 bids submitted July 31 for acquisition of the two big-inch pipe lines and has given all bidders until September 9 to submit exhibits substantiating their proposals.

As was earlier announced, bidders may not change the basic terms of their offers but they may file minor amendments, clarifications, and supplemental data. A number of bidders expressly asked this privilege at the time the original proposals were made, some of them explaining that they lacked time to prepare such material for the bid opening and others stating that they preferred to submit details in confidence rather than incorporating them in the public offer. As a result, some of the published bids appeared very vague and indefinite in comparison with others which were highly detailed, but the supplemental data may go far to equalize this disparity.

Data particularly desired by WAA include details of financial resources, technical operating proficiency and knowledge of the pipe-line business, connections or lack of connections with "monopoly interests," economic surveys indicating that the bidder will be able to obtain supplies and markets to make the operation successful, and assurance that the bid will fulfill the WAA objectives of operation as a common carrier available to small as well as large operators and that the lines will be maintained in condition for military use in case of another emergency.

Box-Car Shortage

THE nation faces its greatest box-car shortage in history this fall and the petroleum industry stands to suffer considerable hardship in spite of a number of special concessions recently granted by Office of Defense Transportation.

ODT officials predict that there will be a shortage of some 75,000 cars a day for 6 months or a year and that as a result many shippers will have to let their goods pile up in warehouses for sheer inability of the railroads to move them to markets. Because of bumper crops and high industrial production more freight is being loaded on the railroads at present than at any time during the war, while many freight cars have gone out of service due to wrecks and excessive wear.

To help meet the crisis ODT has revised and tightened its wartime requirement that box cars be loaded to the maximum weight capacity stenciled on the car (usually 80,000 to 100,000 lb.) or to the car's full volume capacity, regardless of the minimum carload rate. In doing so it eliminated a former exemption for heavy loadings which would damage the freight, requiring special permits for exemptions where hardship is shown.

As a result of protests from shippers of petroleum products ODT has now made a number of special exemptions to its full-loading order. One of these is that liquids, semi-liquids and pastes in drums, barrels, or fiber containers of 40 gal. or more need be loaded only one tier high but must cover the entire floor space of the car. This covers lubricants and many other petroleum products, and its primary reason was that heavy drums stacked two or three tiers high could not be unloaded without special equipment.

Other special provisions just approved by ODT include the following: straight carload shipments of petroleum products not otherwise exempted, in packages in fiber cartons, shall be loaded to a weight of not less than 55,000 lb.; mixed carload shipments of petroleum products in drums, carloads or buckets, 45,000 lb. minimum; asphalt in packages, 80,000 lb. minimum; wax in bags, five tiers high or 65,000 lb. minimum; wax in packages, 80,000 lb. minimum; wax in slack barrels, two tiers high or 50,000 lb. minimum; wax in slabs, loose, 65,000 lb. minimum until October 31, 80,000 lb. minimum between November 1 and March 31.

Taxation of Co-ops

A PRECEDENT for taxation of co-operatives in this country is seen in the recent action of the Canadian Government in subjecting co-ops to regular corporation taxes. The decision, incorporated in the Canadian Government's budget for the next fiscal year, was based on recommendations of a Royal Commission which had been investigating the subject of co-op taxation for some time.

The decision will apply regular corporation taxes to the undistributed profits of cooperative enterprises, that is, to their accumulated earnings and surpluses not paid out in dividends to members. Co-ops will not be subject to the excess profits tax, so that as long as this tax remains in effect they will have some advantage over share-holding corporations. However, the Canadian plan will deter co-ops from accumulating large amounts of capital for expansion purposes, which is the chief complaint made against this method of business.

The Canadian action is expected to spur efforts in the United States to impose federal corporation taxes on co-ops, and the issue may come to a head next winter when Congress tackles a general revision of the revenue laws.

Heavy Late-Summer Demand Pushes Gasoline Prices Up

by Dahl M. Duff

THE Middle West tank-car gasoline market moved up ⅛ cent late last week as a result of unexpectedly heavy late-summer demand and continued buying by major suppliers.

Most regular-grade refinery gasoline was moving to the jobber trade at the fractionally higher level of 6⅞ cents, Group 3 basis. The amount of "undermarket" and distress material was limited. Premium grade generally was ¾ cent higher, despite efforts of some refiners to reestablish the old 1-cent differential.

The gasoline-price advance followed the announcement of Standard Oil Co. (Indiana)—market leader in 11 middle western states—of an increase of ½ cent in tank-wagon prices effective August 29. The previous tank-wagon advance came July 30 following the general nation-wide crude-oil price increases. At the time, Indiana Standard raised tank-wagon gasoline prices 1 cent and burning-oil prices ½ cent, plus freight-rate corrections.

Informed market sources predicted a further slight rise in the tank-car gasoline market. Marketers were expecting heavy motor-fuel consumption to continue well into fall, considerably longer than in normal prewar years.

The natural-gasoline market in the Mid-Continent area was extremely strong early this week. Refinery needs for blending winter-grade motor fuel contributed to the brisk trading in the product. The range of distillate burning oils was described as still somewhat sluggish.

In the East an important development in the demand for intermediate products is the fact that terminal and jobber storage facilities are filled with kerosene and distillates, slowing down current movement from refineries. Prices on these products continue firm in the belief that a record fall and winter consumption is in the offing because of the large number of new burner installations.

Largely the same situation applies to bunker oils. The storage is greater than a year ago but a heavy demand is in prospect for the remainder of the year. Supplies of No. 5 oil are short and the demand is heavy. Gasoline is holding firm in all markets supported with a record Labor Day weekend consumption.

Shell's New Cracker Breaking In

HOUSTON.—Breaking-in operations have started on the Shell Oil Co.'s new catalytic cracking plant here. The unit is the first plant of its kind built specifically to use the newly developed microspheroidal catalyst. At full-scale operation, which is expected in the next few weeks, it will process more than 20,000 bbl. of charging stock daily.

Besides high-octane motor fuel, the plant will produce burning-oil distillates, light fractions for use in alkylation, chemicals and butadiene, and other petroleum products. Started in the spring of 1945, and wholly financed by the company, the "cat cracker" was originally intended as a war plant.

The plant's gigantic size is revealed in statistics released by the company. Its cooling-water system has a pumping capacity of sufficient size to supply a city of 150,000 people. Its electrical requirements are equal to the consumption of a city of 20,000 to 25,000 people. A special railroad built into the plant site carried about 1,500 carloads of materials for use in construction.

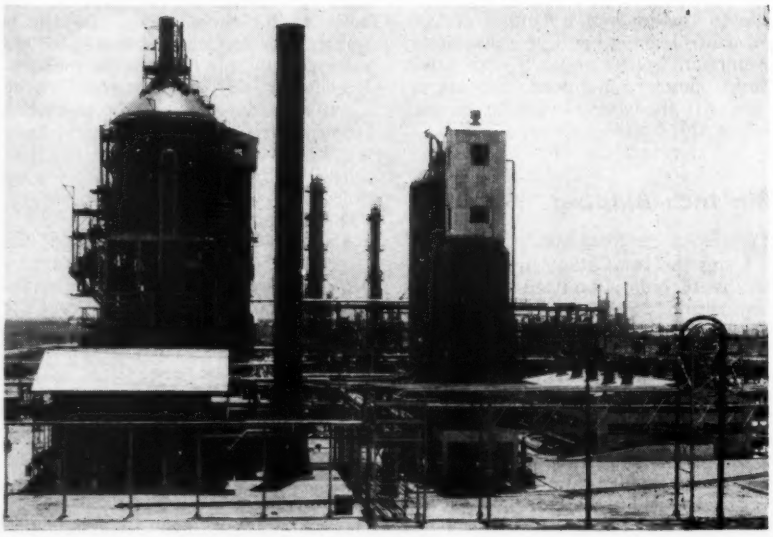
The plant includes not only the catalytic cracker proper, but also a number of auxiliary plants, such as gas recovery, fractionating and treating units, a feed preparation plant and a vast amount of tankage. The sprawling new project occupies a site comprising about 75 acres of a 650-acre plot recently purchased by Shell adjoining its present refinery in Houston.

The new microspheroidal catalyst is more fluid than catalysts normally used, company spokesmen said. Because of the spheroidal shape of its particles, it will not break up as rapidly as catalysts having irregularly shaped particles, and consequently will have a longer life, they added.

In planning the project, engineers gave special consideration to ease of maintenance, convenience of operation, and comfort of employes, the company stated. Automatic control devices are used wherever possible. Control rooms are completely air conditioned, and have tile walls and terrazzo floors. The color scheme was planned to make surroundings pleasant and to limit eyestrain.

In addition, the plant will be more convenient to operate and maintain because its total height is about 40 ft. less than in conventional catalytic cracking units, the company reported. This was made possible, spokesmen said, by the unusual nature of the new catalyst and by numerous innovations in design.

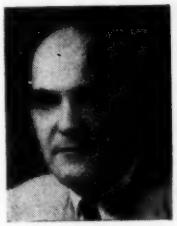
Major contractors were Foster Wheeler Corp., New York, on the cat cracker proper, C. F. Braun & Co., Alhambra, Calif., on the gas plants, and the Fluor Corp., Ltd., Kansas City, on the feed preparation unit and auxiliaries.



Shell's new catalytic cracking plant at Houston, the first plant of its kind built specifically to use the newly developed microspheroidal catalyst

Mayer Becomes Head of Continental Supply Co.

Frederick M. Mayer, president of Continental Supply Co., became its chief executive officer, effective September 1, succeeding William J. Morris. Mayer joined Continental as treasurer in 1932, was elected to the vice presidency in 1933, and became president of the company in July 1945.



F. M. MAYER

W. J. MORRIS

Morris will retire from active management of the company but will continue as chairman of the board of directors in an advisory capacity. His retirement comes after 40 years of uninterrupted service with Youngstown Sheet & Tube Co. and its subsidiaries. Starting with Youngstown as timekeeper in 1906, he advanced to vice president of that company. In 1932 he joined Continental as president.

Holman Sees No Dearth of Oil

NEW YORK.—"United States proved oil reserves are expected to be as great in 20 years as they are today," Eugene Holman, president of Standard Oil Co. (N. J.), said during a recent interview on the National Hour radio program. "Future demands of the country will depend partly on imports which will supplement but not compete with the domestic supply," he said, "and we will make oil from natural gas, coal, and shales if the economic need develops."

When queried as to how much longer we could look to the earth for oil, Holman declared that there was no foreseeable end to our present supply, that reserves as yet unfound should equal the amount of oil produced since the industry began. Holman also pointed out that exploration lagged during the war but today oil operators are hard at work uncovering new sources and the present outlook is that oil will continue to be found in large quantities.

WAA Reoffers Tubing Plant

WASHINGTON.—War Assets Administration announced last week that widespread interest in the disposition of a steel tubing plant in Los Angeles, Calif., built by the Government for war needs and now operated temporarily by Pacific Tube Co., has resulted in the facility being reoffered for sale. Previous offers to buy the property were injected.

Geology Field Trip Set

A 3-day field trip into the San Juan basin of northwestern New Mexico will be sponsored September 20-22 by the geology department of the New Mexico School of Mines and the New Mexico Bureau of Mines and Mineral Resources. Persons planning to attend have been requested to notify Robert L. Bates, chief of the oil and gas division of the bureau at Socorro, N. M.

What Others Say

(Continued from page 63)

but that time is not yet, and the experience gained in the use of airplanes should be a definite asset in the eventual application of helicopters to the field operations.

Subsidy Reduction Opposed

The following letters are comments on the announced reduction of 25 cents per barrel in the stripper-well subsidy effective August 1. This action of the Office of War Mobilization and Reconversion is explained on page 53 of this issue.

Can't Afford Oil Loss

Sirs:

In the last survey made by the Interstate Oil Compact Commission and the National Stripper Well Association covering the year 1944, it is estimated the following additional petroleum reserves may be recovered from stripper wells by secondary-recovery methods under certain price increases:

Increase of 25c per bbl.	337,031,550 bbl.
Increase of 50c per bbl.	979,728,575 bbl.
Increase of 75c per bbl.	1,651,815,950 bbl.

Obviously any reduction in revenue limits the secondary-recovery work that can be performed, and affects the ultimate yield on this class of production. Our nation cannot afford to lose this oil.

FRED SEHMANN,
Executive vice president, North Texas Oil and Gas Association.

OES Acted Prematurely

Sirs:

We believe the Office of Economic Stabilization acted prematurely in reducing the subsidy at this time, particularly before the increase in the price of crude oil in several areas is sufficient to offset this reduction, as is the case in California, Kentucky, and elsewhere. If increases are not immediately forthcoming, it means an actual reduction in the price of crude to the small operators in these areas. We asked OES for a full hearing if any reduction was to be made at this time. This request was denied by Harold Stein of OES on the premise that they had adequate information to arrive at their conclusions. We believe the industry should take cognizance of this decision by immediately increasing the price of crude oil an additional 25 cents per barrel in order to protect the stripper wells and their reserves in the present and future interest of our national economy and security.

H. M. McCLURE,
President, National Stripper Well Association.

DEATHS

James W. Cahill, 56, independent oil operator of Dallas, died August 28 in San Antonio, Tex.

J. M. McMorrow, 49, independent oil operator, died August 27 at his home in Wichita, Kans. He was instrumental in the opening of Curtiss pool in Stafford County, Kansas, last year.

Robert Leonard Ferguson, 48, chief pump maintenance man of Magnolia Petroleum Co., died August 27 in Dallas. He had been with the company 20 years.

Alfred E. Burns, 74, pioneer oil driller and former director of International Petroleum Co., died recently in Toronto. Burns in 1893 began a long career as foreign driller, working in Galicia, Alsace, the Caucasus, and Peru. In 1917 he was placed in charge of International Petroleum's operations in Peru, later becoming general manager of field operations and ultimately a director, retiring in 1934.

Clarence R. Weber, 52, chief accountant in the drilling department of Barnsdall Oil Co. and formerly associated with Pure Oil Co., died August 27 in Tulsa.

P. M. Holden, general manager of stores and retail sales for George E. Failing Supply Co., died August 21 in an airplane accident near Enid, Okla. He had been associated with the company for 12 years.

Reginald G. Smith, 57, chairman of the board of directors of American Bitumuls Co., Standard Oil Co. of California subsidiary, died August 26, in his home in Ross, Calif. A native of Australia, Smith joined Standard in 1911 as engineer in the fuel-oil division. Nine years later he became assistant manager of the division. In 1936 he was elected to the presidency of American Bitumuls and rose to chairman of the board in 1942.

Ben W. Roberts, of Roberts & Hawkins Drilling Co., died August 29 following an automobile accident on the highway between Midland and Odessa, Tex.

W. J. Matych, 72, Sheehan Pipe Line Co. associate, died August 30 at his home in Tulsa, He had been active in the oil industry since 1918, when he same to Tulsa as a drilling contractor from West Virginia.

Merle F. Goff, 39, pipe-line inspector for the Stanolind Pipe Line Co., died August 30 in St. Cloud, Minn. He had been with the company for 10 years.

CALIFORNIA'S No. 1 PROVEN

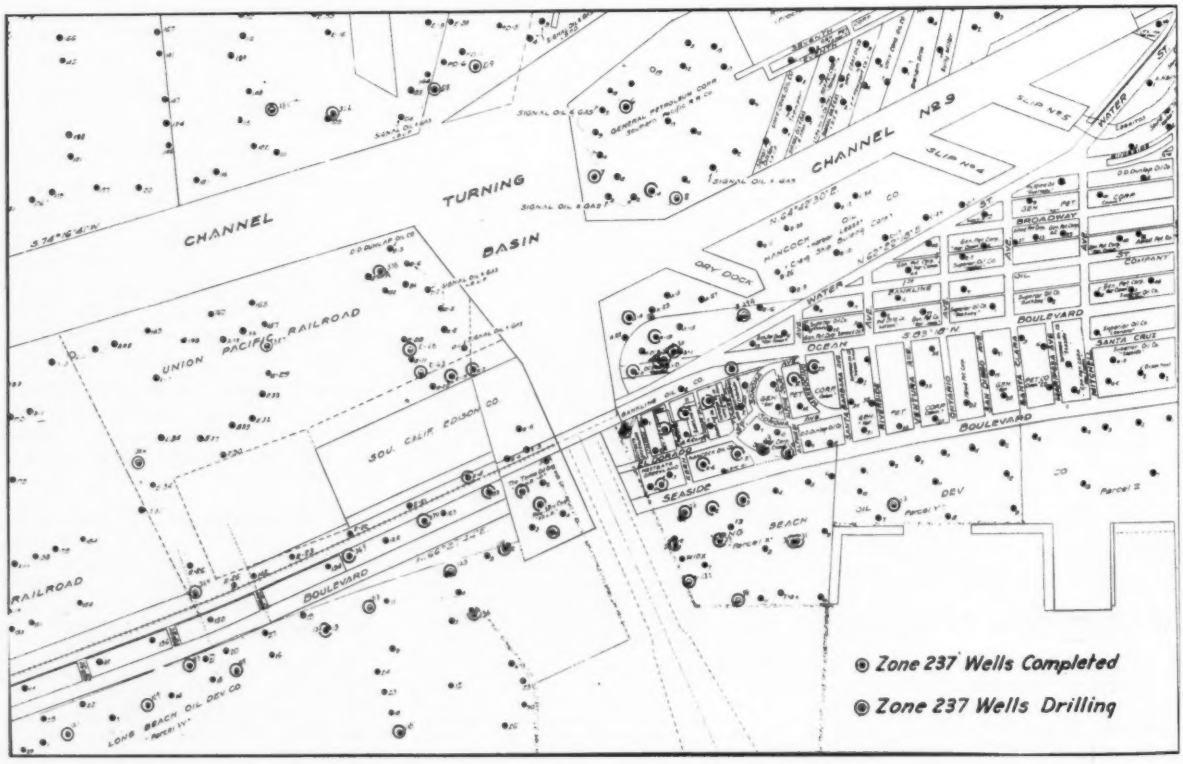
THE pace of development drilling at California's Wilmington field now is directed to the deepest and most recently discovered producing formations: Zone 237 and the conglomerate-schist. So far there are 45 producers completed in Zone 237 and the related conglomerate-schist zones, mostly under Fault Block 4. Extent of the producing zone to the southeast under the waters of Long Beach Harbor has not been defined. The offshore development will follow at a more leisurely rate and with the development of further drilling and production-engineering considerations.

Current production from Zone 237 and conglomerate-schist wells in the Wilmington field is averaging around 25,000 bbl. daily (see Table 1). Crude-oil production per well is limited by capacity of natural-gasoline plants and other existing markets for natural gas. The first Zone 237 well was placed on commercial production at a withdrawal rate of 2,000 bbl. per day. There has been a consistent decrease in the per-well producing rate as new completions are added. Per-well production of 500 bbl. daily became effective August 1 for Zone 237 and conglomerate-schist wells at Wilmington because the market for natural gas is fixed and stabilized at about 25,000,000 cu. ft. per day. Statutes prevent production of gas in excess of commercial markets. Thus oil output is restricted.

Interest in the Wilmington field is focused currently on the newest producing horizon, a normal and understandable result of rising output and the emphasis placed on drilling to the new pay and completions concentrated in that zone through the first half of this year. Development of 25,000 bbl. of new daily production, however, is certain to attract wide attention. Still, sight should not be lost of the fact that Wilmington, disclosed as a major field in 1936, contains the largest remaining proven reserve of crude oil in California and ranks ninth on a national scale. Only East Texas, Keystone, Slaughter, Wasson, Yates, Conroe, Seeligson, and Tom O'Connor, the eight largest fields in Texas, contained more proven reserves at midyear than credited to Wilmington (See pages 146, 147, The Oil and Gas Journal, July 27, 1946).

Cumulative production from the Wilmington field is approximately 305,000,000 bbl. and the withdrawals averaging 121,180 bbl. daily during the last 10 days of July have been exceeded only once in the previous history of the area. As proven acreage has been added by every successful completion in Zone 237 and in the conglomerate-schist, upward revisions

Fig. 1—Portion of the Wilmington field, showing development in Zone 237 and the conglomerate-schist pay section



RESERVE

by H. Stanley Norman

of reserves have been in order. Wilmington, it is estimated, had remaining reserves of 329,971,000 bbl. at end of June but it is already proven conservative by completion of 10 new producers in Zone 237 during July.

None of the engineers and geologists most familiar with Wilmington is willing to predict ultimate productive acreage in the lower pays. For in addition to the six major faults which apparently developed near the end of Miocene time, lateral faulting is obvious in Zone 237 completions. Complexities of structural conditions and sand deposition suggested by the

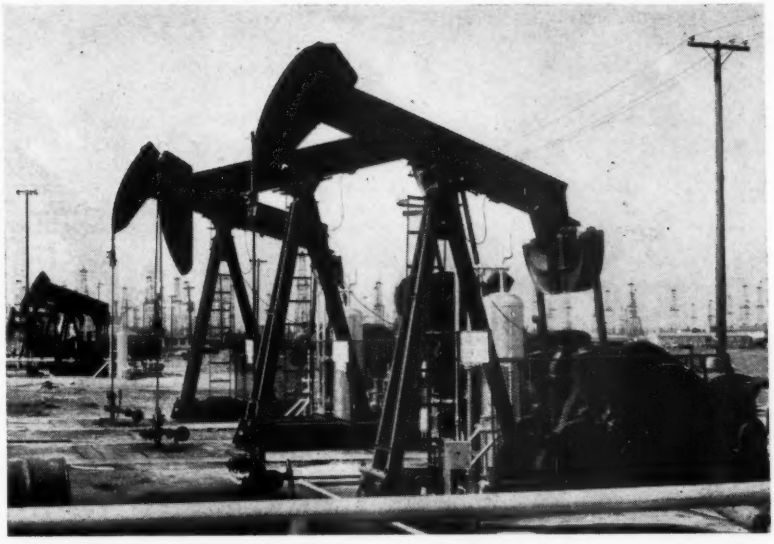
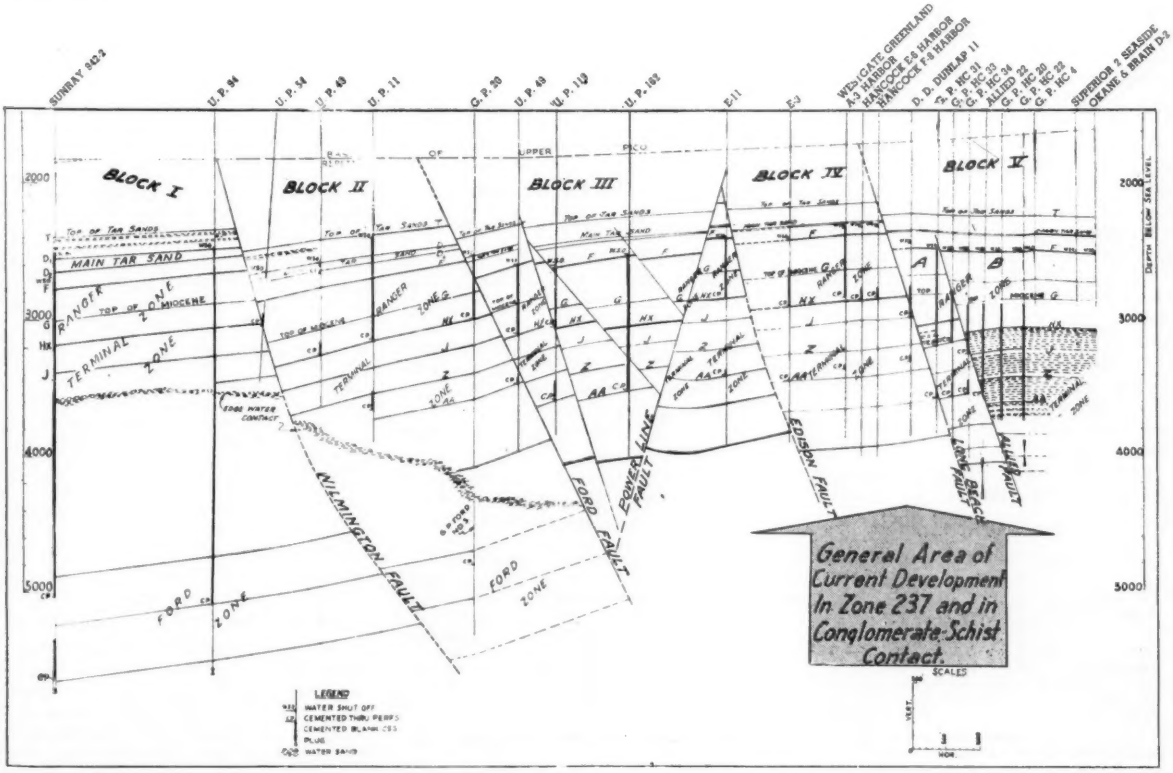


Fig. 2—(Top of page) Typical of the Wilmington practice by which operators effect individual-well completions to the multiple pays

TABLE 1—RECORD OF WILMINGTON FIELD PRODUCTION SINCE APRIL 1946
(Bbl. per day)

Period	Scheduled	Unscheduled	1-D prod.	Zone 237	Total
April 1-10	47,195	42,142	7,775	....	97,112
April 11-20	49,169	43,721	7,745	....	100,635
April 21-30	49,037	43,779	7,928	....	100,744
May 1-10	55,468	42,337	8,022	....	105,827
May 11-20	54,108	44,381	8,066	....	106,555
May 21-31	53,820	43,852	7,382	....	105,054
June 1-10	46,634	42,440	7,729	14,076	110,879
June 11-20	44,842	42,341	8,937	21,704	117,824
June 21-30	44,735	42,365	8,268	28,609	123,977
July 1-20	44,314	42,671	7,758	26,218	120,961
July 11-20	45,048	41,943	7,650	24,985	119,626
July 21-31	43,930	43,665	7,629	25,956	121,180

Fig. 3—(Below) Cross-section of the Wilmington field. Fault Block 4 is location of present deeper drilling. (Map by Read Winterburn, petroleum engineer, Union Pacific Railroad Co.)



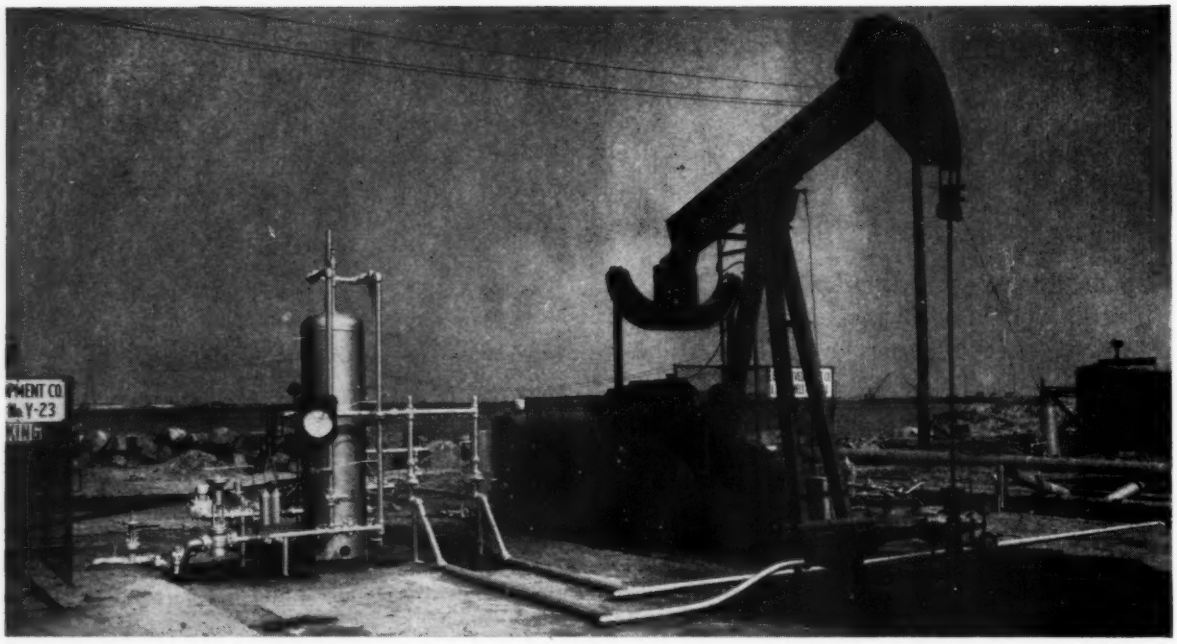


Fig. 4—Separator, metering, and control installation at Wilmington on location provided by filling in shallow edges of Long Beach harbor

lateral faulting thus far disclosed justify the reluctance of geologists and engineers to make predictions in advance of more conclusive development.

Apparently, considerable productive acreage in Zone 237 and the conglomerate-schist remain to be developed southeast of the most southern producers. (Fig. 1). The major faulting, transverse to principal axial trends in the irregularly shaped dome, indicates, in fact, that sand and structural conditions will be found most favorable under the waters of Long Beach Harbor. Filled-in land parcels along the waterfront, shown on the accompanying map as operated by Long Beach Development Co., may be used, extended or supplemented by new fills for reaching farther under harbor waters.

With a single operating entity, Long Beach Development, in position to develop submerged properties without primary thought to competitive drilling and drainage requirements, some time may pass before the structural conditions are known precisely southeast of current producing wells.

Zone 237 takes its name from the Union Pacific Railroad Co. well of that number which was the first at Wilmington to prove existence of production immediately above the conglomerate-schist in the Middle Miocene. The Union Pacific well was not produced from Zone 237 but was completed in one of the upper pays. In the latter part of 1945, one of the smaller operators with shallower wells located between Ocean and Seaside boulevards, near the harbor waterfront, deepened a well and completed it in Zone 237. Original bottom-hole pressure of about 2,500 psi. yield of a desirable 32°-A.P.I.-gravity crude, and a gas-oil ratio of 700 to 1 were factors which prompted other operators to launch an intense program of drilling new wells and deepening old ones to the new pay.

Sand Is Coarse Grained

Furthermore, sand in Zone 237, divided and broken by interbedding of shale, is coarse grained and the permeability ranges from 50 to 1,000 md. (Table 2). The highly permeable character of the sand at certain spots explains the compulsion exerted on offset operators to complete wells as rapidly as possible in the pay which is under current exploitation.

Early in August, 45 wells had been completed in sands comprising Zone 237 and the conglomerate-schist section. Twenty-four of the deeper producers were new, drilled from the surface, while 21 completed in the lower pays were deepened wells most of which previously produced from the Terminal (upper and lower). Thirty-two of the lower-pay producers are completed in Zone 237 sands exclusively while 13 are producing from pay sections which exist both in Zone 237 and in the conglomerate-schist.

Although Wilmington was proven productive by a few shallow wells drilled as early as 1925 seeking an extension of the Torrance field, it was not until 1932 that commercial production was established by completion of Ranger Petroleum Co. 2 Watson at 3,821 ft. for 75 bbl. daily of 13°-A.P.I.-gravity crude. Full-scale development of Wilmington was touched off in December 1936 when General Petroleum Corp. completed 1 Terminal for 1,440 bbl. daily of 20°-A.P.I.-gravity oil in the Terminal zone.

The field now contains approximately 1,500 wells with a majority producing from the Tar, Ranger, and Terminal pays in the so-called Town Lot area which embraces parts of Fault Blocks 4 and 5. Development drilling will continue for several months but at a decelerated rate, indicating that around 1,575 wells will be on production by end of the year.

Approximately 250 ft. of sand is selected for completion by gun perforating, out of a total section of 700 ft. comprising Zone 237 and the conglomerate-schist. Electric logs are made in all Wilmington completions and the sands are selected from this

TABLE 2—DATA ON RESERVOIR CONDITIONS AT WILMINGTON

Productive zone	Porosity (per cent)	Permeability (mds.)	Interstitial water (per cent)
Tar	32	1,000	22
Ranger	34	500	22
Terminal*	32	450	25
Ford	24	100	40
Zone 237†	22	150	

*Average for upper and lower Terminal; †average includes wells also producing from conglomerate-schist contact.

record for gun perforating 7-in. o.d. oil strings. Completion depths vary because of major and lateral faulting but the average for the deeper wells is around 6,950 ft.

There are no particular drilling problems and all types of rotary rigs have been used, mechanical, steam, and electric.

The somewhat rapid decline of reservoir pressure permits use of oil-base mud in current completion practices. Rapid withdrawal of reservoir fluid and gases has caused an increase in the gas-oil ratio to a current average of 1,100 cu. ft.

Despite frequent reductions in the per-well production rate, new completions have been sufficient to offset the downward adjustments in unit withdrawals. However, the current production of nearly 26,000 bbl. per day from Zone 237 and conglomerate-schist wells is about three times greater than the rate scheduled by the Conservation Committee of California Oil Producers. Scheduled production of 8,153 bbl. daily, for example, during the last 10 days of July compares with actual yield from Zone 237 of 25,956 bbl.

In addition to its position as the number one proven oil reserve remaining in California, Wilmington is an important gas reservoir. Natural-gas reserves remaining to be produced at Wilmington, exclusive of Zone 237, were about 415,500,000,000 cu. ft. at start of the year. Original gas in place for the Tar, Ranger, Terminal, and Ford zones, all above the Zone 237 and conglomerate-schist section, was estimated at 708,553,510,000 cu. ft. Ninety per cent of the original gas in place is considered recoverable.

One aspect of current development which may prove harmful to the ultimate recovery of crude from Wilmington field is the practice of deepening producing wells to the lower and more immediately prolific pays. Several wells have been deepened from the Terminal zone, for example, which were producing up to 200 bbl. daily from that pay. Engineers generally agree that it will take careful work, and possibly at quite high expense, to reestablish production at rates existing previous to deepening if and when exhaustion of the lower pay dictates plugging back to one of the shallower sands.

Drill-Pipe Cutting Job in Signal Hill Made at 14,601 Ft.

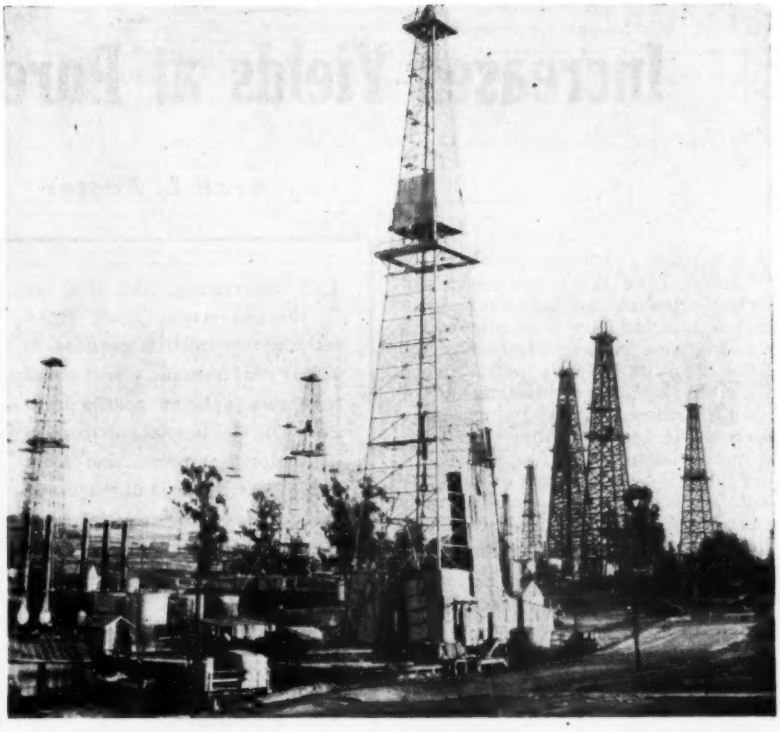
IN what is believed to be the deepest successful cutting job on record, Shell Oil Co., Inc., has recently cut and recovered all but a fraction of a string of 3½-in. Grade D drill pipe at a depth of 14,601 ft. on a fishing job at its 48A Alamitos deep test in Signal Hill, California. The drilled depth at the time was 14,870 ft.

The pipe had parted 10 ft. above the rotary table while coming out of the hole. Stands already removed accounted for 2,390 ft. and the remaining 12,480 ft. fell back to bottom. An impression block was run and showed that the portion of the tool joint remaining on the top of the fish was so badly egg-shaped that it would have to be milled off. This was the first operation performed in preparing the fish for recovery.

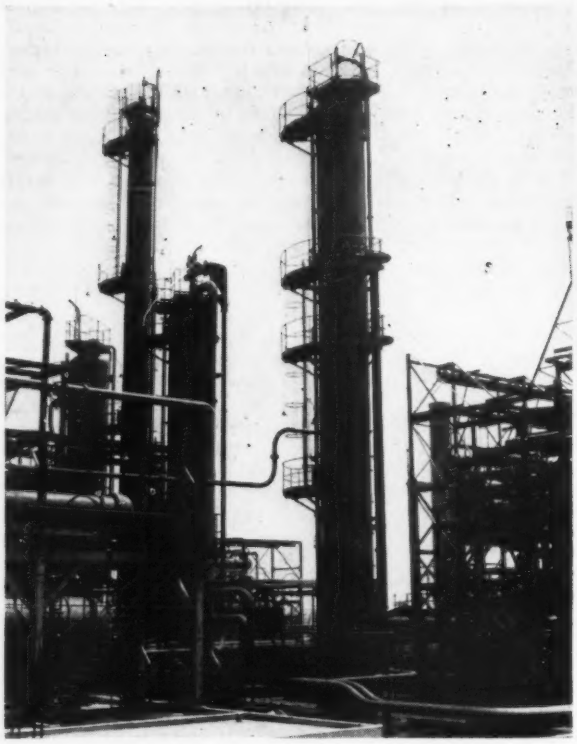
Next, a socket was run in an attempt to pull the fish and to break circulation. The fish could not be loosened, so the socket was released and the fishing string withdrawn from the well. It was then decided to attempt to recover the fish by taking hold of it with a fishing string. This was equipped with a Shaffer-Hamon releasing socket. A 2¼-in. o.d. Shaffer internal pipe cutter was lowered through this fishing string and the fish to cut the pipe. The internal cutter was run in on a string of 1.66-in. o.d. upset tubing and set in the fish at 14,775 ft. However, the kinked condition of the fish made rotation impossible at this point, and the cutter was raised to 14,730 ft. Rotation was begun with 15 turns of torque on the tubing string, and most of this torque remained on the string during the entire process of cutting. The fish was cut at 14,730 ft.—probably the deepest cut ever made—and the tubing string and cutter removed from the hole.

An attempt was then made to pull the fish and break circulation, using the releasing socket that was on the fishing string. A pull of 280,000 lb. was taken on the fish and high pressure applied with the pumps. At 4,000 psi. the packer in the socket blew out, necessitating release and removal for installation of a new packer. The release was made without the use of a bumper sub, which had been left off because of insufficient inside diameter for lowering the cutting string through it.

The second cut was successfully made at 14,601 ft. and the cutting string removed from the hole for subsequent pulling operations. This time the socket packer successfully withstood a pump pressure of 5,000 psi. which was applied in trying to break circulation, but no circulation could be obtained. Continued working of the fish finally loosened it at the 14,601-ft. cut. Several attempts were made to recover the remainder of the fish but it was so badly stuck that the operators finally whipstocked past and resumed drilling from 14,601 ft.



View of Shell's drilling rig at Signal Hill which made the record-depth drill-pipe cut



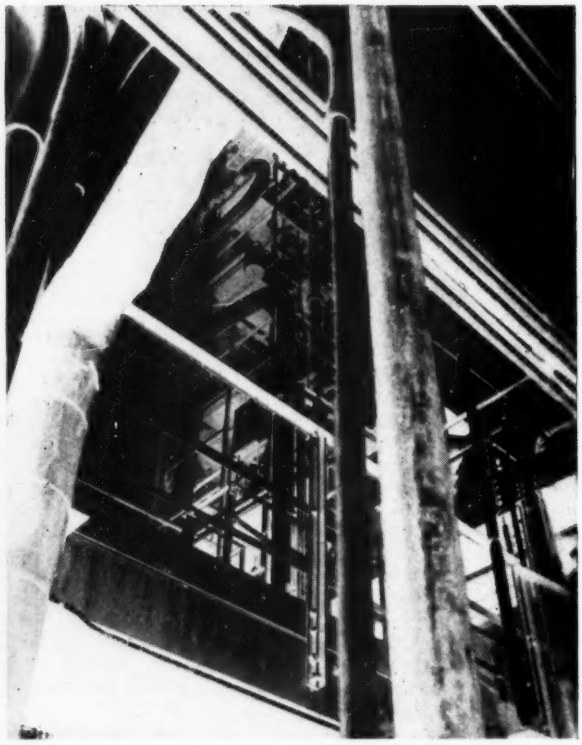


Fig. 1—(Left) General view of the fractionating section of Pure Oil Co.'s hydroformer section at its Toledo refinery, with the reactor piping at right. Fig. 2—(Right) Cracked-oil fractionator for the C.H.P. units discussed in this article

New Coking Unit Adds Versatility, Increases Yields at Pure's Refinery

by Arch L. Foster

BY rearranging the flow so that all crude from three combination units is reduced to 30 per cent bottoms which is fed to a new delayed coking unit, Pure Oil Co. is enabled to raise its motor-fuel production from 52.5 to 59.4 per cent of the crude charge. Heavy or residual fuel-oil production is reduced from 27.6 to 17.2 per cent while other main streams are held to the same yields. Octane rating average for the greater gasoline yield is raised about four A.S.T.M. numbers.

AT no time in the history of oil refining have plant executives and technologists studied more intensively the possible improvements which may be made in their units and processes than during the period since V-J Day, 1945. In distillation and in cracking these changes which have been made range all the way from a mere change in a few details of the flow through a single unit, to the installation of catalytic cracking, polymerization, new thermal crackers, and other major undertakings. In this article will be given a condensed story of the rearrangements and new units installed in Pure Oil Co.'s Toledo refinery, to meet the present and immediate future challenge of petroleum products' markets.

The basis of operations at this refinery for some years has included three combination units: C.H.P. units Nos. 1, 2, and 3, and an independent thermal reforming unit. More recently a toluene-recovery unit has been installed for recovering toluene and sometimes other aromatics from the product obtained from a Hydroformer unit which has been in operation since early 1944. In the present setup, the naphtha side stream from the crude towers of all C.H.P. units is drawn off, stripped and sent to the Hydroformer charge tank for upgrading in that process. This fraction usually has a boiling range of 250°-450° F.

Two of the three combination units are four-coil assemblies, a reformer section, one light gas oil and one heavy gas oil section, and a vis.-breaker section, all working in synchronism with the crude-topping section of each. One unit has only three cracking coils. Their crude capacities are 9,000, 11,000, and 10,000 bbl.

per day respectively, for a total of 30,000 bbl. of crude handled daily. The first unit runs normally to 50 per cent crude bottoms; the second reduces the crude to 40 per cent bottoms; while the third unit produces 30 per cent bottoms.

Under the present plan of operation, a complete new coking unit is being installed which will be discussed in detail later herein. To prepare a uniform reduced crude for charge to the coker, the existing thermal reforming unit is being converted to the service of preparing feed for the new units. Through this coil the 50 per cent and the 40 per cent reduced crude fractions from the topping sections of the first two units will pass, then be flashed in a tower to make a uniform product of 30 per cent reduced crude, to be used as charge stock for the new coker unit. The coker is designed for handling 6,720 bbl. per day of this reduced crude, as will be discussed later.

According to the new plan of operation on No. 1 unit, the vis.-breaker coil will go to once-through heavy-gas-oil cracking service; the light-gas-oil section will remain in its present service. The reformer section will go into once-through light-gas-oil cracking service, on stock derived from the new coker unit. The heavy gas oil from No. 1 crude section will go as before, to the heavy-gas-oil coil on that unit. Unit No. 2 cracking sections will operate in the new plan in the same manner that Unit No. 1 handles cracking stocks. No. 3 crude unit will continue as before to make 30 per cent bottoms. As may be calculated from the quantities and percentages given above, the coking unit has the capacity required to handle approximately 75 per cent of the total 30 per cent reduced crude which will be available from the total crude processed in the plant. When all three combination units are operating, as well as the coker unit, one coil in No. 3 unit will break the viscosity of the extra amount of topped crude, in a manner analogous to that used in earlier operations. Cracking will be carried on at the same time in No. 3 unit, in the remaining clean-oil coil of this unit.

The No. 3 unit can operate its crude-topping section entirely independently of its cracking coils, if desired. Because of its flexibility and versatility, the cracking sections of this unit will operate as the control valve or balance wheel of the entire

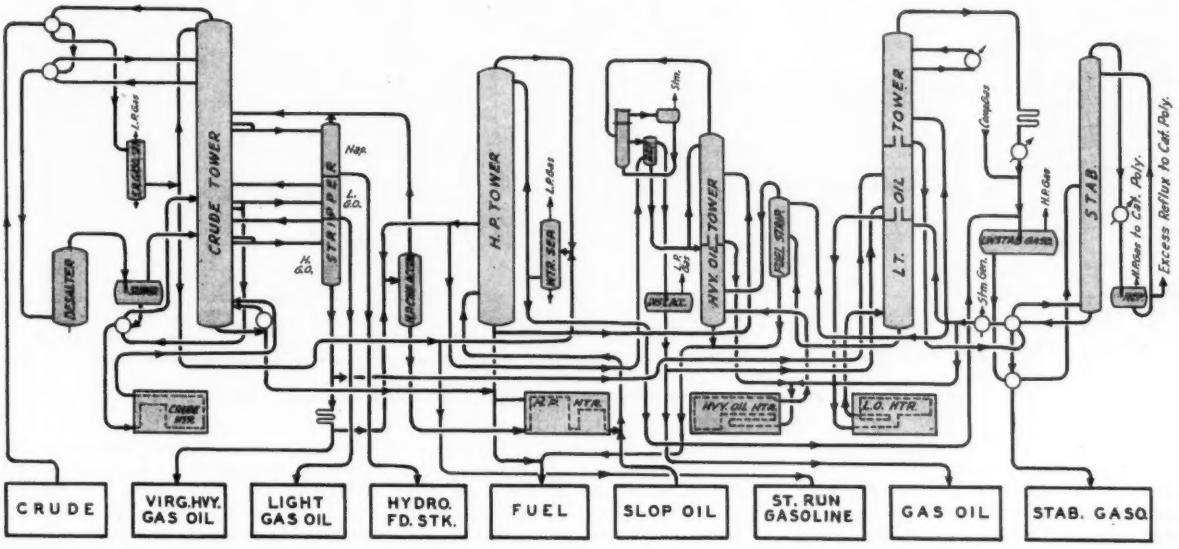
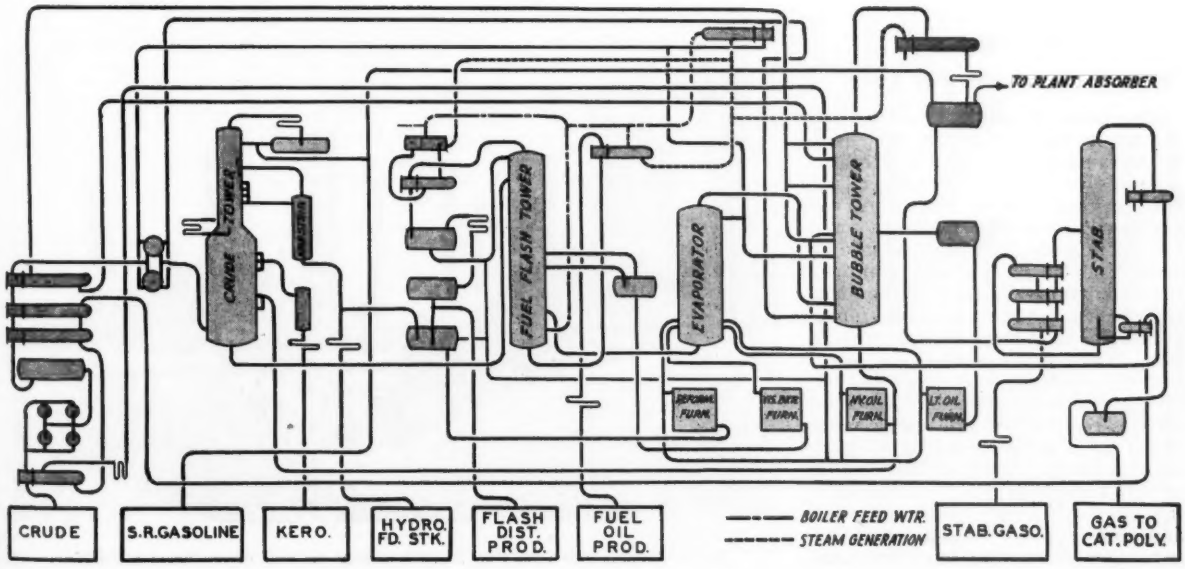


Fig. 3—Flow diagrams of C.H.P. units Nos. 1 and 3, as they are fitted into the operation with the new coking unit. The new unit is not yet completed



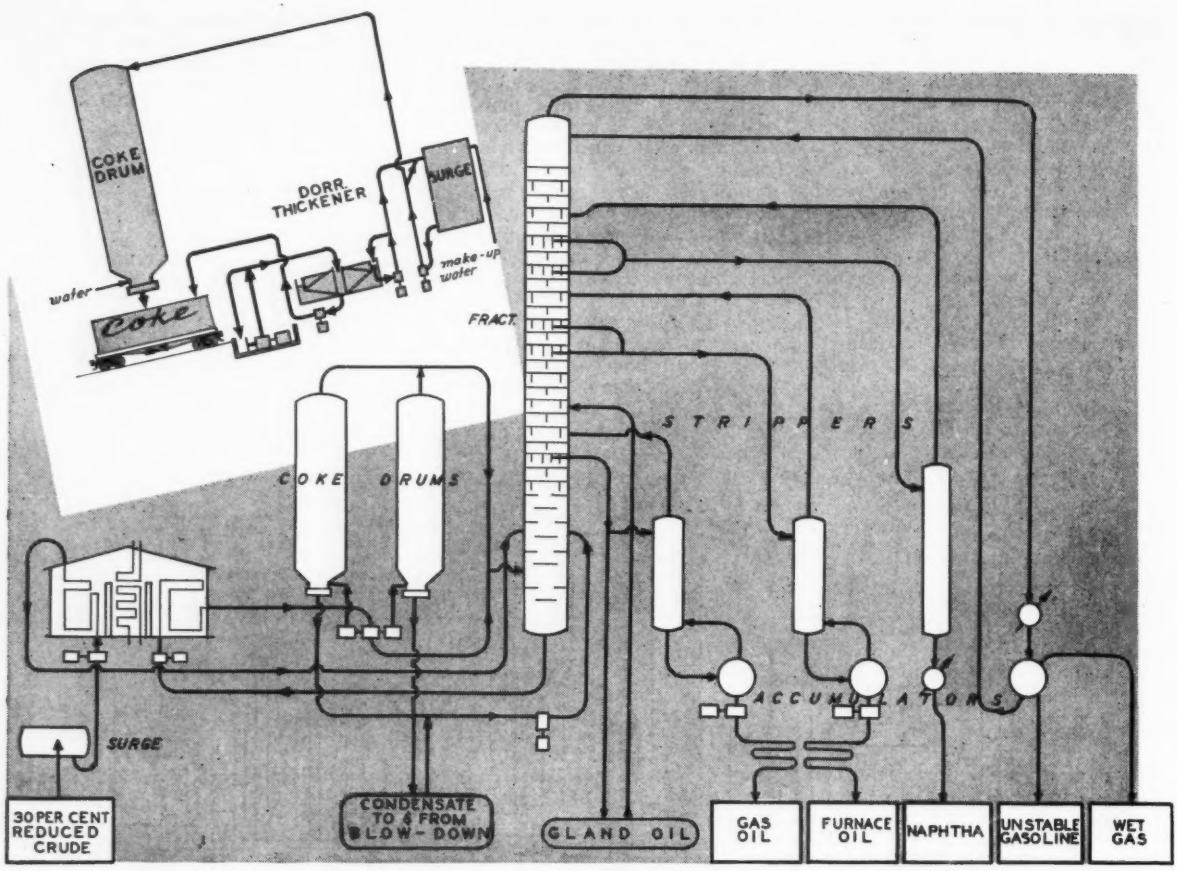


Fig. 4—Flow diagram of the new coking unit, latest addition to Pure's Toledo refinery

refinery. All available reduced crude above the feed demands of the coker will be processed in the vis.-breaker section of No. 3 unit. If the coking unit takes all the topped crude, such as may be the case when Nos. 1 and/or 2 are shut down for any reason, then No. 3 will serve as a gas-oil cracker, and so balance out the operation under these unusual but recurring conditions.

Two Main Trunk Pipe Lines

Two basic trunk lines will be employed in the refinery to distribute oil streams of 400°-600° F. light gas oil and 550°-850° F. heavy gas oils to the cracking sections. These lines can distribute these fractions as required to various units. The light-gas-oil line takes the virgin product from all three units in addition to the light gas oil produced in the coking operation. This light stock may go to units Nos. 1 and 2, as needed for once-through cracking, or it may go to the present recycle light-oil cracking coils as required to any one or more of the three units. A storage or surge tank at the terminus of this line is used to smooth out the flow, and keep the light cracking stock production and consumption in balance. The heavy-gas-oil streams have the same general setup. All streams are carefully fractionated to minimize naphtha contamination of the cracking stocks. The cracked oil fractionators are operated normally at about 200 psig.

As long as the coking unit is in operation as planned, enough extra topped crude—30 per cent—will be available to keep the vis.-breaker coil in one of the three units full. When the coker is shut down each combination unit reverts to its combination operation as carried out prior to the installation of the coker. The coking unit, however, can be readily

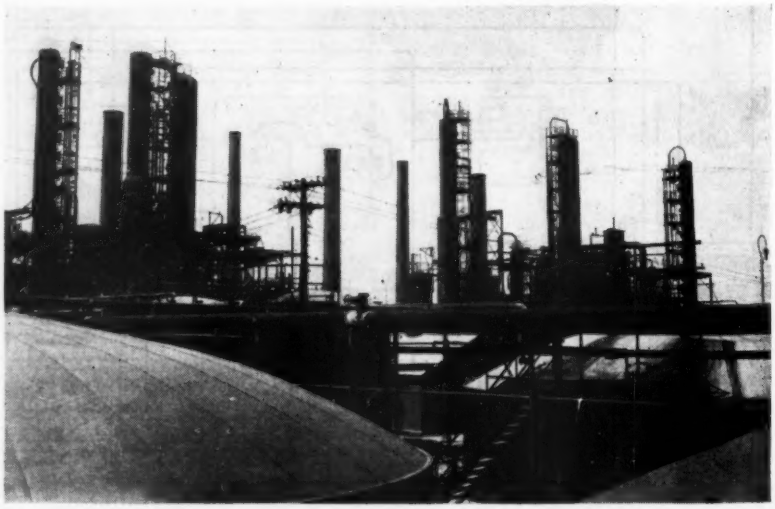


Fig. 5—Combination units Nos. 1 and 2, part of the new arrangement at Toledo

converted to a vis.-breaker whenever desirable and thus can balance out the over-all operation as may seem best at any given time, depending on the relative market demands for gasoline and residual fuel oil. Considerable plant flexibility is being added by the provisions for possible visbreaking at the new unit in the event that coking may be unattractive at certain periods. If visbreaking is the attractive operation for processing reduced crude, the use of the new facilities for this service will allow a more severe cracking of this material than is now practically possible in the existing visbreaking facilities at the C.H.P. units.

The various streams from the combination units include the high-pressure cracked gases which go to the general gas-recovery system; the liquefied C_3-C_4 fraction with the stabilizer reflux vapors make up the charge to the catalytic polymerization unit; this gives additional flexibility to the operation, enabling the plant to polymerize propylene or propylene-butene mixtures as desired. These vapors are treated to remove sulfur compounds before further processing is carried out. The 250° F. end-point straightrun gasoline from the crude unit goes direct to the treating and blending unit for either motor or aviation-fuel preparation. The cracked gasoline must be treated also, before being ready for blending.

New Delayed Coking Unit

The delayed coking unit will be new throughout, and is designed to add a great deal of flexibility of both product type and product quality to the refinery operations. The flow of the charge in the coking unit is shown in Fig. 4. The unit consists essentially of a double-coil heater, two coke drums which are actually soaking drums, a fractionator column, three stripper columns, and the various auxiliaries necessary for such a unit. These auxiliary units include a new induced-draft cooling tower which handles the cooling water requirement of about 5,100 g.p.m.

Operation of the new coking unit is essentially as follows: Reduced crude representing 30 per cent bottoms from the raw crude is pumped to the reduced crude heater coil at above 600° F. temperature. Its temperature is raised to about 850° F. and the stream is flashed directly into the fractionator. Bottoms from this tower are sent directly to the second coil of the heater, the temperature is raised to about 910° F. and the transfer stream is flashed into the coking drums. This tower is 96½ ft. high, with its first 42½ ft. lined with 11-13 per cent chrome steel sheet. This tower operates at between 15 and 20 psig.

This system introduces two separate streams into the tower. The recycling of the heavy bottoms results eventually in the deposition of a coke residue into the drums and the cracking of a maximum amount of the heavy stock. The transfer-line fractions which are not coked pass from the top of the coke drums to the fractionator. From the tower overhead comes cracked distillate which is collected in an accumulator from which reflux is drawn and the remainder is forwarded to the stabilizer unit for reduction to the required vapor-pressure specifications.

From the side of the tower are withdrawn, successively from top to bottom, a naphtha stream, a furnace oil or light gas oil and a heavy gas-oil stream. The naphtha stream is stripped with steam in a tower 16 ft. high by 3 ft. i.d.; the other two streams are stripped in separate towers each 3 ft. in diameter by 12 ft. high. The gasoline overhead stream is normally of about 270° F. end point; the naphtha about 250°-420° F.; the furnace or light gas oil about 400°-600° F.; the heavy gas oil ranges from 550° to about 850° F. The gland oil required by the pumps of this unit is supplied as a side stream from the fractionator and returns from the pumps to the tower. These gas-oil and furnace-oil streams may be cracked or otherwise treated as outlined for the C.H.P. units discussed earlier in this article, or may be disposed of as finished products, as desired. Recovery of process heat is accomplished by generation of 130-psi. steam in the convection section of the heater and from the excess heat in the fractionating tower.

Each of the coking drums mentioned above will be of such capacity to handle the coke production for 24 hours. In general they are not filled completely but deposition is stopped when each is about three-fourths full, after which the other drum is switched into the line, and the partially filled drum is emptied of coke and made ready to take its turn on stream.

The deposit of coke in the drum is removed by the hydraulic method, jointly developed by Shell Oil Co., Inc., and Worthington Pump & Machinery Corp. A rotating cutter is passed down through the bed, cutting a hole of about 36-in. diameter through the mass, vertically. A high-pressure water line is passed through this hole, top to bottom, and a special head with several nozzles is attached to the lower end of this line. Water is forced through this line and out of the jet nozzles under some 1,500 psig. pressure, while the line rotates throwing the high-velocity stream against the coke wall and cutting it away, to drop out of the open manhole at the bottom of the drum. The coke so removed and exit water are caught in open cars or gondolas, handled on a railroad track, and then removed to be dried and sold for domestic or industrial use. The water used for decoking is recovered and clarified for reuse. The drum so cleared of coke is "headed up" at top and bottom and in turn is switched into the system again after being heated to process conditions when the alternate drum has been filled. This "turn around" occurs each 24 hours, normally. The condensate formed in the drum immediately after switching it onstream is sent to blowdown, to be returned to the unit for further processing.

Yield Data—Old and New Operations

Yields in any refining operation vary of course in wide limits, controlled by crude properties, and the innumerable variations in operating procedures. A representative picture of comparative results is given in Table 1 which shows the product yields at Toledo with and without the use of the coking unit just described above.

TABLE 1 — OVER-ALL YIELDS FROM REFINING OPERATIONS WITH AND WITHOUT DELAYED COKING

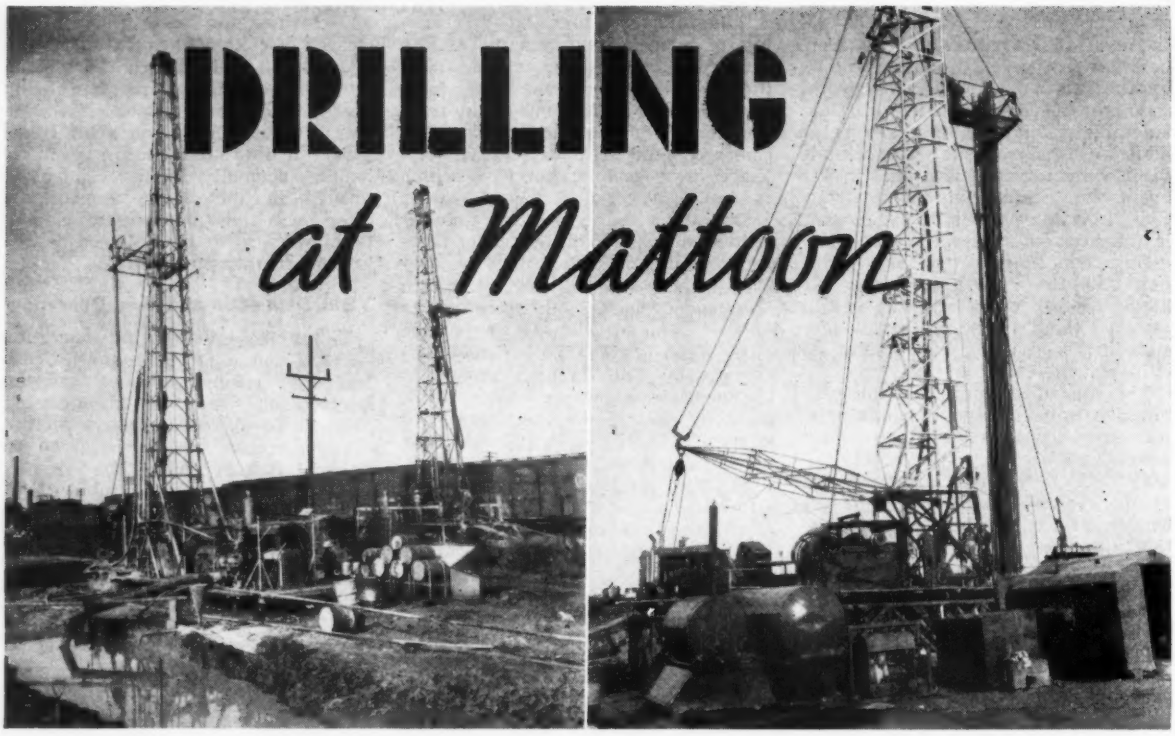
Product—	Yields, per cent of charge: Without coking	With coking
Total gasoline	52.5	59.4
Kerosene	1.5	1.5
No. 1 furnace oil	1.5	1.5
No. 2 furnace oil	3.1	3.1
Diesel fuel	3.1	3.1
Naphtha	1.9	1.9
No. 6 fuel oil	27.6	17.2

The gasoline made from visbreaking only of 30 per cent reduced crude, as outlined above, from the 6,720 bbl. per day showed 60-octane number, A.S.T.M., clear; that is, without tetraethyl lead. By the use of the delayed coking process herein described, the total gasoline production from the same quality of reduced crude is expected to show an A.S.T.M. octane number, clear, of about 64, a definite improvement of four numbers. At the same time the yield is increased by 6.9 per cent, based on the total plant crude run, a tremendous advantage to the refinery economic balance. The yields of subordinate products are on identical bases in each case to simplify comparisons.

While this outlined operation is only one of the very many which may be adopted to meet postwar conditions, it gives a definite array of facts to show what can be accomplished to meet competition in yields and qualities, especially octane ratings, without too much immediate outlay of invested money.

George Douglas, of Denver, for many years executive secretary of the Colorado Petroleum Industries Committee, has retired from that position and is succeeded by **O. S. Wood,** who was in charge of gasoline rationing for OPA in Colorado during the war.

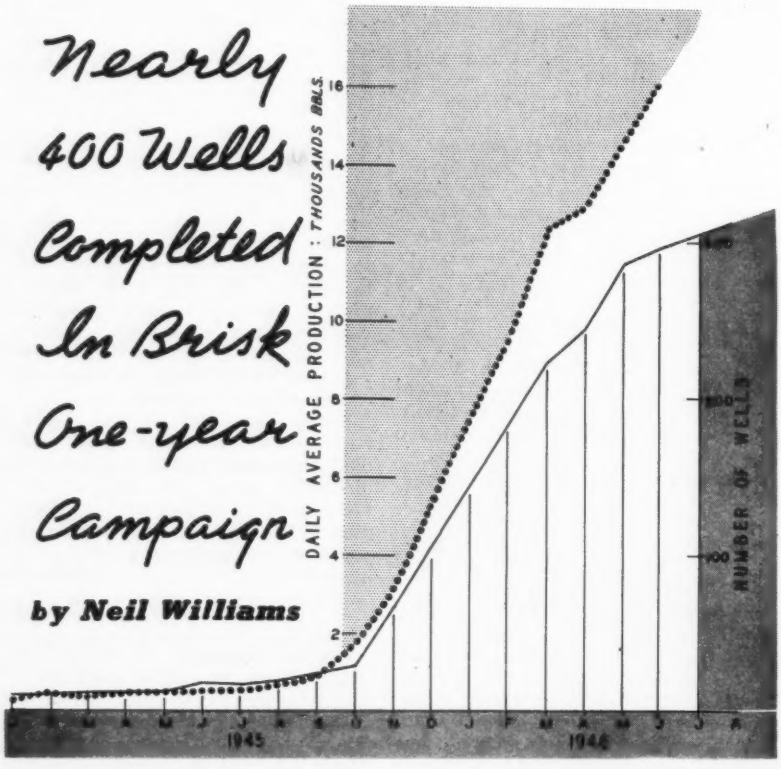
DRILLING at Mattoon



(Left) Close drilling along the Illinois Central Railroad right-of-way which extends for several miles through the heart of the Mattoon field. Rig at right (operated by Menhall Drilling Co.) is especially designed of narrow width to be set up within the close space between the track roadbed and the right-of-way line. Offsetting well is being drilled by Keating Drilling Co. for Carter Oil Co. (Right) One of the larger rigs operating in Mattoon field, using elevated substructure. Rig is owned by Geophysical Exploration Co.

Nearly 400 Wells Completed In Brisk One-year Campaign

by Neil Williams



Illinois pools, with shallow depths, good markets, multi-pay completion opportunities, are developed in a hurry

NOW in its final stages of development, the Mattoon pool in Coles County, stands out as the largest field uncovered in the Illinois area since the days of Louden, Clay City, and Salem. From the standpoint of developed new production, it ranks among the most important fields which have come to the front in the country during the past year.

Extending 8 to 9 miles from its northernmost to southernmost limits and varying from ½ to 1½ to 2 miles in width, the field embraces an overall area of more than 6,000 acres. With an estimated ultimate average recovery of around 3,200 bbl. per acre, it represents an oil reserve totaling in the neighborhood of 25,000,000 bbl.

Development has been carried out largely since July 1945; most of it since October. Although first production was found as early as February 1939, succeeding drilling up to a year ago was limited to a few scattered tests. Of these, three were productive, but because the wells were small, and erratic sand conditions were indicated, they aroused little interest.

The first well, drilled by Wheeles & Whiseman, produced initially 18 bbl. of oil and 20 bbl. of water per day but lasted only 2 weeks and was abandoned. Production was from the Cypress sand, topped at 1,875 ft., one of the two main producing hori-

zons of the field. Located in SW SW NW 1-11n-7e, it was southeast and outside of the present producing area.

More than a year elapsed before a second test was started. This was drilled by Carter Oil Co. Located more than a mile northeast of the first well, the 1 Seamons, NW NE SW 35-12n-7e, was well within the present productive area but found sand conditions poor, and after drilling to a total depth of 4,908 ft., in the St. Peter formation, was abandoned May 14, 1940.

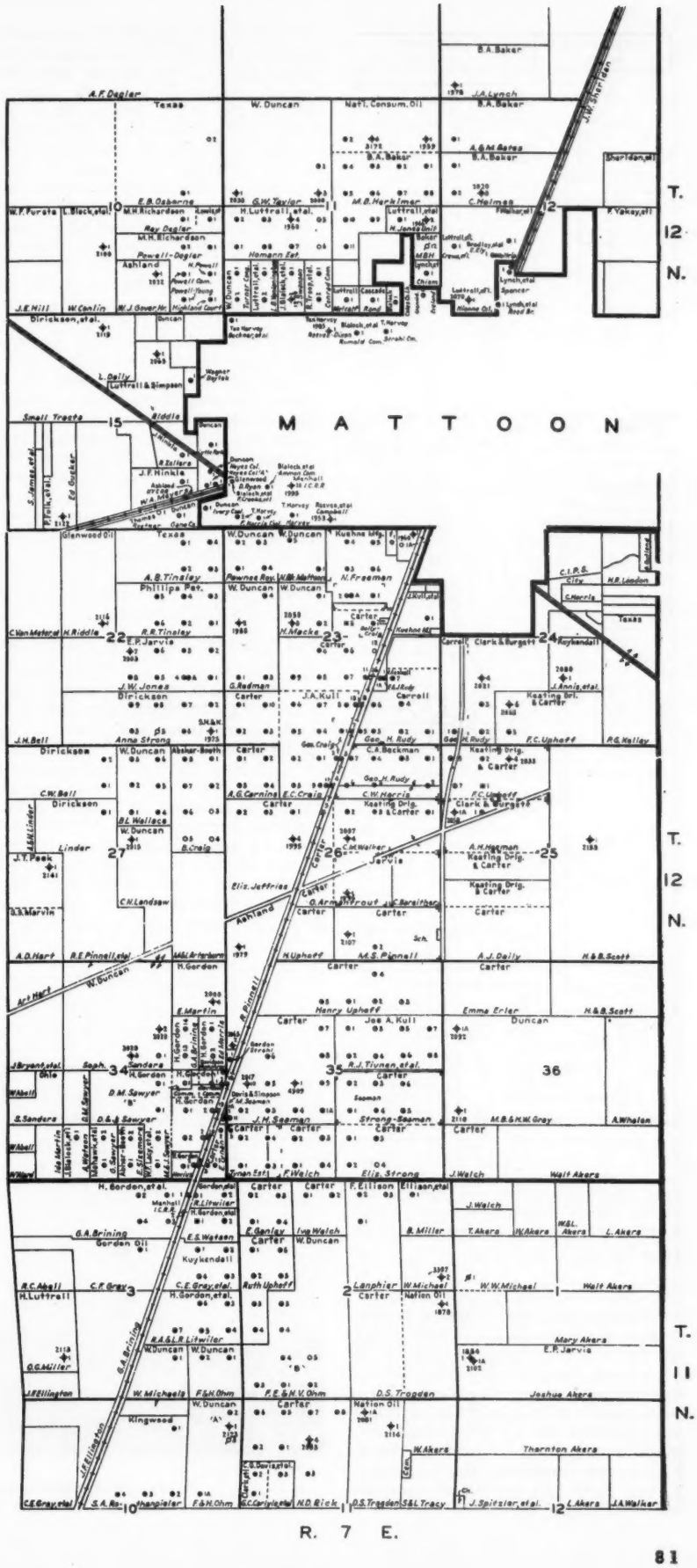
Showings prompted Carter to drill another test immediately. The latter (1-A Seamons), located a short distance southeast of No. 1, is credited as the discovery well of the field. It was completed June 4, 1940, flowing initially 121 bbl. of oil daily from sand at 2,002-27 ft. This sand at that time was reported as being in the McClosky lime but since has been classed as the Rosiclare, one of the field's main pay zones.

During the remainder of 1940 and 1941 Carter drilled three more tests. All were on structure but found poor sand conditions and were abandoned. No further development was undertaken until 1943, when Keating Drilling Co. drilled and completed 1 Uphoff, about 2 miles northeast of the Carter discovery well, making 25 bbl. of oil and 24 bbl. of water daily. It produced for 1½ years before being offset. One additional well, located near it, was drilled in 1944, and no further development was undertaken until July 1945.

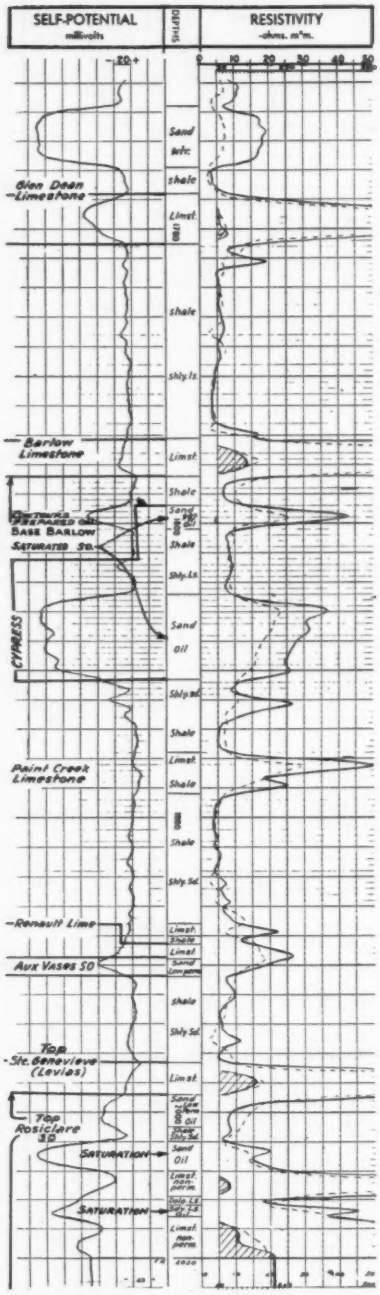
In the latter month, Gordon Oil Co. completed a 168-bbl. Rosiclare well (1 Brining in 3-11n-7e), ¾ mile southwest of the Carter discovery well. This was followed by the completion by J. A. Kull of a 260-bbl. well (1 Craig), about 2 miles northeast. With completion of these wells an influx of drilling rigs began and since last autumn the field has gone through an active development reminiscent to some extent of the booms which characterized drilling in some of the state's fields from 1938 to 1940.

Drilling increased rapidly to a peak during January and February of this year when more than 35 rotary rigs were kept running. Since then, with the field becoming defined and proved up, it has slackened gradually until now it has leveled off at six rigs running. At this rate of development, the field still is the most active spot in the entire Illinois, Indiana, and Kentucky area.

At the beginning of August the field had 313 producing wells with an average daily production of 143 bbl. each. Fifteen additional wells were being put on the pump for completion while 13 others, with ro-



Mattoon field, Coles County, is latest large Illinois discovery. It is 55 miles southeast of center of state



Type electric log for Mattoon. Recently Devonian saturation has been found at 3,100 ft. (The Oil and Gas Journal, August 24, page 141)

tary moved off after drilling to the producing sands and running casing, were waiting on spudders for drilling in and completing. Upwards of 50 dry holes have been drilled in or immediately around the limits of the field, which now is considered fairly well defined on all sides. Development is estimated to be from 90 to 95 per cent complete. Up to August 1, the field had produced approximately 3,125,000 bbl.

Production is distributed among 37 operators. Of the 313 producing wells, Carter Oil Co., the largest operator, has 53; Walter Duncan, 30; Gordon Oil Co., 22; B. A. Baker, 13; J. A. Kull, 14, The Texas Co., 7; Kingwood Oil Co., 6; Phillips Petroleum Co., 6; and miscellaneous independents, 162. The field is served by two pipe-line outlets, including Interstate Oil Pipe Line Co.'s line to the East Coast, and Ashland Oil & Refining Co.'s line to Chicago.

The townsite of Mattoon, a city of 15,000 population, and covering more than a section, lies almost wholly within the productive area, but except for a comparatively few wells around the north, west, and south edges, has not been drilled. Under present city ordinances development of the townsite is almost prohibitive. Drilling within the city is restricted to one well to four blocks, and unanimous consent of all property owners within a block is required before a well can be started. Since individual wells are small, royalty returns per single lot usually are not enough to justify owners to permit drilling on their property.

Well Spacing; Producing Formations

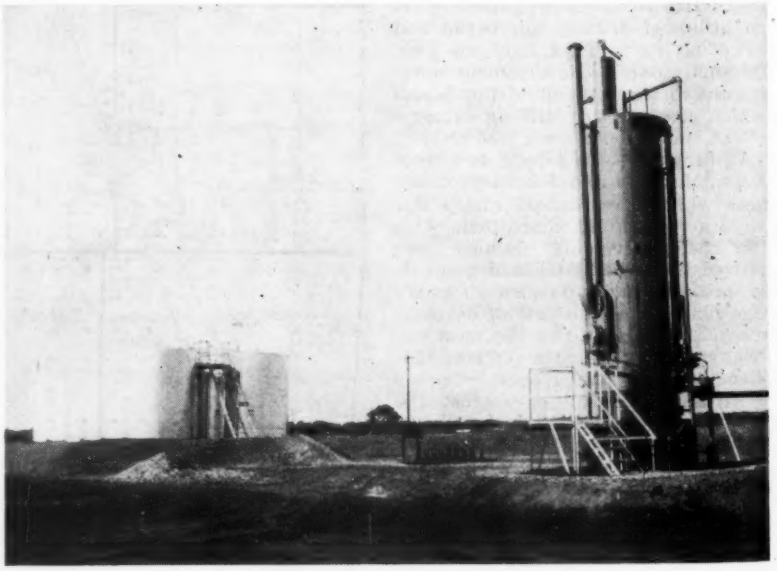
Drilling on the whole has followed a regular 660-ft. spacing pattern with one well to 10 acres. The only important exceptions to this are along the rights-of-way of the Illinois Central and New York Central railroads and around one 1½-acre triangular tract. The latter tract, located in the southeast corner of the NE SE 34-12n-7e, is bounded on one side by the Illinois Central right-of-way and on the other sides by tracts of three different ownerships. It was leased by Davis & Simpson, who drilled twin wells to two different pays. Offsetting required the drilling of six wells within 10 acres.

The Illinois Central right-of-way extends almost the entire length of the field with production on both sides. At places it is 200 ft. wide but much of it is only 35 to 45 ft. wide and in the drilling of it, close spacing of offsetting wells has been required. Menhall Drilling Co., which holds the lease to this right-of-way, uses a specially designed rig of narrow width and laid out lengthwise to be set up in the close quarters between the tracks and the right-of-way line. Offsets in many instances are not over 75 ft. from the right-of-way wells.

The New York Central right-of-way presents the same complication but it cuts across only a comparatively short distance of the north end of the field.

Main producing horizons are the Cypress sandstone of the Chester (upper Mississippian) series which comes in from 1,745 to 1,850 ft.; the Aux Vases sandstone at the base of the same series usually encountered from 1,880 ft. to 1,925 ft., and the Rosiclare sandstone of the Ste. Genevieve group of the Iowa (lower Mississippian series) from 1,950 ft. to 2,025 ft. In addition several wells have been completed in the McClosky lime, which lies immediately below the Rosiclare.

A half dozen tests have been drilled to the Devonian, which comes in around 3,170 to 3,180 ft. Several of these, located north of the townsite, have produced gas up to 5,000,000 cu. ft. daily, and some oil for short periods. Latest of interest has been National Consumers Oil Co. 2 Herkimer, SW NW NE 11-12n-7e, an



Typical tank-battery installation in Mattoon field, showing flow-treater installation at the right

old well deepened to the Devonian, which on drill-stem test at a total depth of 3,166 ft. showed for from 5,000,000 to 10,000,000 cu. ft. daily and sprayed some oil. As this is written it has run casing for a production test. Another recent test (S.H.K. Drilling Co. 1 Strong) in SE SE SE 22-12n-7e, west side of the main part of the field, also found showings of oil in the Devonian at 3,120-82 ft., but tests proved unsatisfactory and the well is standing temporarily abandoned.

Sand conditions are spotty because of varying amounts of shaling in the different horizons. Consequently, there has been no regularity as to which sands, if any, would be productive from well to well. This accounts for the drilling of so many dry holes within the productive limits and the presence within the field of sizable areas of nonproduction. The Cypress and Rosiclare sands have been the most consistent. It was been the general practice to drill all wells to and sufficiently into the Rosiclare sand to see what it looks like. Where sand conditions have been favorable in this formation, wells have been completed in it. Otherwise, wells have been plugged back to one of the higher sands. Where more than one horizon has carried favorable sand conditions, wells generally have been completed in all the good sands.

Of the 313 producing wells, 76 have been completed in more than one sand. The distribution of these wells by productive sands and their relative importance as indicated by their average initial production, a reflection of the amount of sand and shaling condition found, is shown in Table 1.

Drilling and Completion Data

Well costs generally run from $15,000 to $17,000, varying somewhat with different operators, depth of the lowest pay sand, length of time and difficulties of cleaning out and completion, and number of sands in which completed. Drilling contractors' prices range from $2.50 to $2.75 per foot.

As in conventional Illinois practice, holes are drilled and oil string run and cemented with rotary rigs, which then are moved off and the wells completed with spudder units or light cable-tool outfits. Most operators drill the holes only to the top of the lowest prospective pay horizon, or just a sufficient depth into it to see what it looks like, and then set their casing on top of the lowest sand to be produced. Carter Oil Co., the largest operator, follows a slightly different practice and drills the entire hole through the lowest prospective pay zone with rotary before setting casing. However, the casing, as in the case of the other operators, is set on top the lowest sand to be produced.

Drilling involves no particular difficulties or hazards. Wells can be put down to the Cypress sand (1,800 ft.) in about 5 days and to the Rosiclare sand (2,000 ft.) in 7 days. A recent well was rigged up and drilled to the Rosiclare in less than 4 days with only 57 hours being required under the surface casing. As a rule completion of wells requires considerably more time, and often greater cost, than the actual drilling. Completion time usually runs from 10 days to 2 weeks for single-sand wells and often from 3 to 4 weeks for dual-sand wells.

Surface formations, which carry quite a bit of gravel, require use of high-viscosity mud to maintain hole, remove the gravel and sand, and hold up walls for running and cementing casing. Commercial gel mud must be mixed for this purpose. From 150 to 200 ft. of surface casing is considered desirable to set through the gravel although a number of operators run as little as 100 ft.

Hole under the surface pipe generally is started with clear water and drilled with what native mud is made to within about 200 to 300 ft. of where the producing sands start coming in. Formations to that depth give no trouble, and since the water and natural mud speed up drilling, there is no particular reason for going to the trouble and extra cost of conditioning mud.

Drilling and Producing Equipment

Gel muds, using some quebracho and caustic to control viscosity and water loss, are added as the producing section is approached. Control of mud characteristics is important, although not difficult, through this part of the hole. Viscosity usually is maintained between 35 and 42 seconds, water loss at a maximum of 16 cc., and weight from 9 to 10 lb. per gal.

Geology for correlation and contouring usually begins at the base of the Barlow limestone, which is picked up from 1,780 to 1,800 ft. To that point no particular watch is kept geologically of the hole. Below that marker, intervals to the respective sands are fairly uniform and are closely checked for coring and sampling points. At this stage of field development, however, coring has been reduced to a minimum. Several operators have followed the practice of coring one well every 40 acres. Sand determinations are made on the basis of electric logs run before setting oil strings.

Hole and casing sizes vary with different operators. Standard practice for Carter Oil is to start with 13⅜-in. hole, using 10¾-in. surface casing, and then drill 9-in. hole for 7-in. oil string. Most of the others start with 10⅞-in. hole and set 8⅝-in. surface pipe. Through this they usually drill 7¼-in. hole and run 5½-in. oil string. Some operators may use only from 100 to 150 sacks of cement for the oil string, particularly in wells to be produced from only one sand. Several, however, require about 250 sacks. For multiple-zone wells, sufficient cement should be used to place the top behind the pipe above the uppermost producing sand.

Rotary equipment is conventional for Illinois. It consists of light, portable, and semiportable rigs with mast-type derricks. Each rig usually has two engines developing about 600 hp., one 12-in. or 14-in. stroke pump, and a hoist capable of 3,500 to 4,500-ft. drilling. Butane has been used generally as fuel although diesel engines have been employed in some cases.

Multiple-sand completions are made by running alloy metal sections in the oil string opposite the upper sands to be produced. These windows are opened with acid or rotary scrapers. Perforating of casing usually is not adequate since the sands are hard and shooting is resorted to to facilitate productivity.

Because of shaling, net sand thickness varies appreciably among wells. There is approximately 90 ft. of Cypress section but of this the saturated portion will not total more than 40 ft., and ranges from stringers up to that amount. The average is from 15 to 20 ft., for which a normal shot would be from 60 to 80 qt. of nitroglycerin. The Aux Vases sand averages about 8 ft., where found, requiring a shot of from 30 to 35 qt. Average net thickness of the Rosiclare sand is about 22 ft., taking from 80 to 90 qt. The Rosiclare sand is limy and frequently when there is quite a bit of lime, it also is acidized. For this, from 500 to 2,500 gal. of acid will be used, depending on the amount of lime.

(Continued on page 104)

TABLE 1—WELL COMPLETIONS BY FORMATIONS

Formation—	No. wells	Total initial prod. (B.P.D.)	Average initial prod. (B.P.D.)	Initial prod. biggest well (B.P.D.)
Cypress	55	7,842	143	732
Aux Vases	1	18	18	....
Rosiclare	180	22,242	124	535
McClosky*	1	121	121	....
Cypress-Rosiclare	66	10,428	158	528
Cypress-Aux Vases	3	659	230	372
Cypress-Rosiclare-McClosky	2	455	227	270
Aux Vases-Rosiclare	3	117	39	70
Rosiclare-McClosky	2	401	200	35
Total	313	42,083	135	....

*First reported as McClosky; might be Rosiclare.

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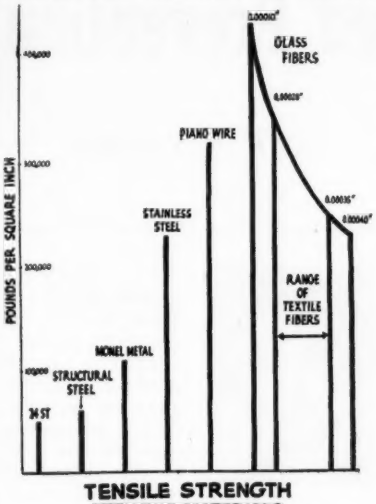
PROGRESS IN METALS

by W. L. Nelson
Consulting Engineer

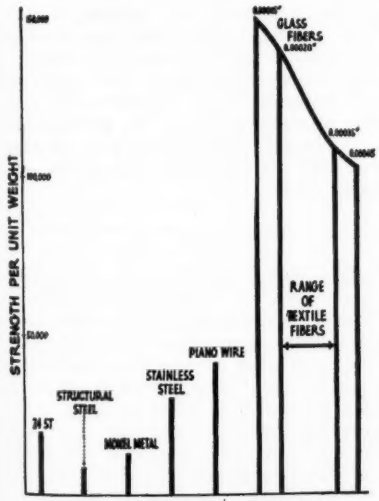
Glass Fibers

ALTHOUGH the high strength of glass fibers and certain textile fibers have long been recognized, their exceedingly high strength will surprise many engineers. Fig. 1 shows



TENSILE STRENGTH VARIOUS MATERIALS

Fig. 1



SPECIFIC TENSILE STRENGTH VARIOUS MATERIALS

Fig. 2

(Courtesy Materials & Methods)

the tensile strength of glass and other fibers and of several metals including 24ST aluminum alloy (4.2 per cent copper, 1.5 per cent magnesium, 0.5 per cent manganese). The strength of the fibers is excelled only by piano wire. The same materials are considered in Fig. 2 except the strengths are given per unit of weight (specific tensile strength) rather than per unit of cross-sectional area.

Textile fibers are obviously flexible but even glass fiber exhibits a high degree of flexibility when imbedded in plastic materials. Such laminated plastics (using glass fiber) exhibit better tensile strength, compression strength, and flexure than structural steel or 24ST aluminum. The superiority of the laminated plastics over the metals is even greater when compared on a weight basis. More complete information is given by Slayter and Collins in the March issue (page 720) of Materials & Methods.

First Class Materials

ONE cannot agree entirely with Editor Knight's plea for a wider use of high-quality metals and alloys but he does mention an application of interest to the oil industry. According to his editorial entitled, "Pennywise and Pound Foolish," in a recent issue of Materials & Methods, an official of Haynes Stellite Co. "was telling of a critical war situation following destruction by fire of equipment for making 100-octane gasoline. More isomerization pressure vessels had to be built in a hurry and one of the successful solutions was the lining of ordinary steel vessels with Hastelloy metal which resists the common acids and other corroding chemicals. The same vessels were used also for making neoprene, isobutane, various styrenes, and related products.

"The significant point is that the initial cost with Hastelloy lining was $20,000 per vessel in excess of that of the material previously used. However, from the standpoint of long life the higher initial cost was more than justified. Some of these vessels have by now been used constantly for 2 years with no sign of serious deterioration."

Although the use of anything short of the best for the job at hand may be a shortsighted policy, it remains a fact that obsolescence of processes is often more important in oil refining than is physical depreciation. This is particularly true while the industry is facing a rapid conversion into catalytic cracking processes, the economic feasibility of which has not been established for commercial operation. Undoubtedly some catalytic processes will survive, but which ones? There are applications which justify superior metals, as for automotive exhaust mufflers and exhaust pipes, the use of light alloys for gasoline-truck tanks, and stainless steel for lightweight bubble trays for fractionating towers.

Liquid Level in Pressure Vessels

FOR measuring the level of liquid in a vessel under pressure, the so-called "Nivometer" was developed several years ago by Brown Boveri for steam boilers, hot-water accumulators, and liquids under pressure. The transmission of the movement of the liquid requires no bushings or glands. It also avoids any kind of mechanism under pressure.

A U-shaped pressure tube of nonmagnetic steel contains mercury. An iron ball floats on the surface of the mercury in one of the limbs. Through the ball the movement of the column of mercury is transmitted through walls of pressure tube to measuring mechanism purely magnetically.

The two poles of a powerful, pivoted permanent magnet enclose the tube without touching it so that the magnet, because of the field of force, must follow the movement of the ball. By giving a suitable shape to the shoes of the poles of the magnet, an exact correspondence of the indicating mechanism with the position of the ball is insured.

The position of the pivoted magnet, which corresponds to the level of the liquid, is indicated by a pointer on a large scale visible at considerable distance. The instrument also registers variations on a recording strip. Adjustable contacts can be added to operate signaling devices or perform control.

The Nivometer is connected to the pressure vessel by two pipes so that one of the limbs of the U-tube is in communication with the liquid below the lowest level while the other is connected to the vessel above the highest level by a tube in which there is a constant head of liquid.

A typical use is for compressed-air-loaded hydraulic accumulators for operating forging presses which work with pressures of 300 to 320 kg. per sq. cm. where it is a water-level indicator and controls a relay regulating the feed and the outlet of the accumulator.

The level of the contents of the accumulator is transmitted to signal lamps in the press workshop so that the staff can at all times satisfy themselves as to the state of charge of the accumulator and arrange the operating processes accordingly. In the lowest position the Nivometer stops the flow of water out of the accumulator until a certain minimum reserve of water is again present.

Abstract: A. Spoerli, Brown Boveri Rev., Vol. 31, No. 8, p. 270, as abstracted by Engineer's Digest (British), Vol. 6, Oct. 1941, p. 277.

The Agents Basic Causes Control and Prevention OF CORROSION

by F. A. Prange

The author is metallurgical engineer for Phillips Petroleum Co., Bartlesville, which firm he joined in 1941, upon graduating from Purdue University with an M.S. in metallurgical engineering. His work has been concerned with corrosion and general metallurgical problems in Phillips' plants, processes, and equipment. In this article, Prange has approached the subject from a viewpoint of general theory, and giving the reasons for different types of corrosion and the various methods of prevention and control. The second part of the two-part article will appear in an early issue.

WHAT causes corrosion? In its simplest form, the answer is similar to the answer for "what makes water run downhill?" Water tends to run downhill because at the base of the hill, of course, a mass of water has less energy than when it is at the top. In other words, given the opportunity water will seek a lower energy state. Metals, likewise, corrode because their environment allows them to go to a lower energy state, such as in the form of oxide, chloride, etc. Gold and some other metals do not oxidize because at atmospheric temperatures these elements are more stable (at a lower energy state) in the metallic form than in the form of oxides. (In the strict sense, the energy state should be defined in terms of free energy of a reaction—a thermodynamic concept.)

In the preceding paragraph the words "given the opportunity" were used. These are very important. Sometimes the surface of the metal can be altered so as to keep the corrosive environment away. Paint is one means. Quite frequently, though, reliance is made on another and more automatic method. This is the formation of films on the surface of the metal by the action of the corroding agent. Two clear-cut divisions can be made in the study of corrosion. First is the study of the corrosive agents themselves, and second is the study of the nature of the metal and its surfaces.

Corrosive Agents

It may sound paradoxical to say "corrosion always involves at least two materials"—the material being corroded and the material causing the corrosion. But that fact must be kept in mind. It is just as important to know the corrosive agent as it is to know what is corroding and how it does so.

In the production of crude oil, the primary corrosive agents for steel are oxygen (from air), hydrogen sulfide, carbon dioxide, organic acids, and sometimes hydrochloric acid—used in acidizing the well. A secondary factor is the acidity associated with hydrolysis of calcium and magnesium salts. Oxygen is extremely active. Rusting, pitting, and tarnishing may all be manifestations of the corrosive effect of air. In oil-field work air generally leads to pitting, in which only a relatively small portion of the metal is removed before failure occurs.

At atmospheric pressure hydrogen sulfide and carbon dioxide in the small amounts commonly present in gas form only slightly acid solutions when dissolved in water. Under high pressure these gases may form markedly acid solutions (pH as low as 3.5). Only the lower-molecular-weight organic acids (such as acetic and propionic acids) are of importance, because the higher-molecular-weight acids are both fairly insoluble and form somewhat protective iron soaps. In the absence of hydrogen sulfide or carbon dioxide the water produced from lime formations should not be acid, since the limestone would effectively neutralize the other acidic materials.

Types of Corrosion

Various metals exposed to a single corrosive agent, or a single metal exposed to various corrosive agents will corrode in different ways. Two broad classes are apparent. The first and least in over-all importance is direct chemical attack. One example of this would be the scaling of steel at elevated temperatures. Another is the effect of acid on a pure metal.

The second general type of corrosion might be called "electrolytic," since it involves electric currents and electrically conductive solutions. In some cases the path of these currents may be very long, as in stray-current corrosion of pipe lines. In minute pitting the path may be less than 0.001 in. As can be inferred from the words "electric current," factors in determining the rate of corrosion include resistance, voltage, amperage, area, and other more theoretical terms. In general, the higher the current density (current per unit of area) the greater is the rate of penetration. The higher the voltage and the lower the resistance, the greater is the possibility of attaining high currents and increased corrosion. Keeping this in mind will make an understanding of corrosion easier. Examples of electrolytic corrosion

are the action of acids on commercial metals, rusting, bimetallic corrosion, and pitting. The role of electric currents in some of the common types of corrosion will be discussed later.

Inhibitors and Accelerators

An inhibitor is a material capable of slowing down a reaction. A common example is the inhibitor added to hydrochloric acid used in acidizing wells. It is added to decrease the rate of attack on steel. The action of acid inhibitors is to leave a film on the surface of the metal which slows down the rate at which corrosion product leaves the surface or prevents access of the corrosive agent to the surface. This film may be a layer of hydrogen, a monomolecular film of organic compound, a thin oxide layer, a concentration of colloidal material like glue, or even a film of metal such as arsenic. Among various inhibitors used in the laboratory or field are pyridine, quinoline, formaldehyde, gelatine, mercaptans, terpineol, alkaline chromates, and arsenic trichloride. The use of organic inhibitors is limited largely to acids. As temperatures increase inhibitors become less effective. Generally the purpose of inhibitors is to reduce intolerably high rates of corrosion to moderate rates. Most inhibitors cannot be relied on to reduce low rates of corrosion to very low rates. It is quite likely that natural inhibitors are present in many well fluids, though their identity and properties have yet to be thoroughly studied.

In the production of oil is encountered a very good accelerator—the chloride ion. The chloride ion is formed when chlorides are dissolved in water. The reaction can be written for ordinary salt as:

$NaCl \rightarrow Na^+$		and	Cl^-
Salt gives	sodium ion	and	chloride ion

Corrosion can be particularly severe in the presence of chlorides for several reasons. Solutions of chlorides have high conductivity, and the chloride corrosion products are usually more soluble than salts of other anions. In addition, the chloride ion tends to disperse solid corrosion products into colloidal suspensions, minimizing the tendency to form protective films. The chloride ion is also able to penetrate more easily than other anions such as acetate and sulfate. Thus the presence of chlorides tends to accelerate corrosion, although chlorides in neutral solutions are not in themselves corrosive.

Effect of temperature.—As temperature increases, the reaction rate of the corrosive agent on the clean metal increases. Occasionally behavior may be irregular in that corrosion decreases or stops at the higher temperatures. There are several possible explanations. One is that the solubility of the corrosive agent—for example, air or carbon dioxide—may decrease so fast as to more than compensate for the higher reaction rate accompanying higher temperatures. Another is that at some temperatures protective films may form, whereas at other temperatures the films either do not form or are not protective.

Effect of liquid flow velocity.—With increased velocity more corrosive agent is brought to the reaction area and the concentration at the corroding surface is higher. A still more destructive effect of high-velocity fluids is to remove the protecting film forming on the surface of the metal. This gives the eroded appearance sometimes seen on the seats of steam valves and on pump impellers. Descriptive term for this type of corrosion is "corrosion-erosion."

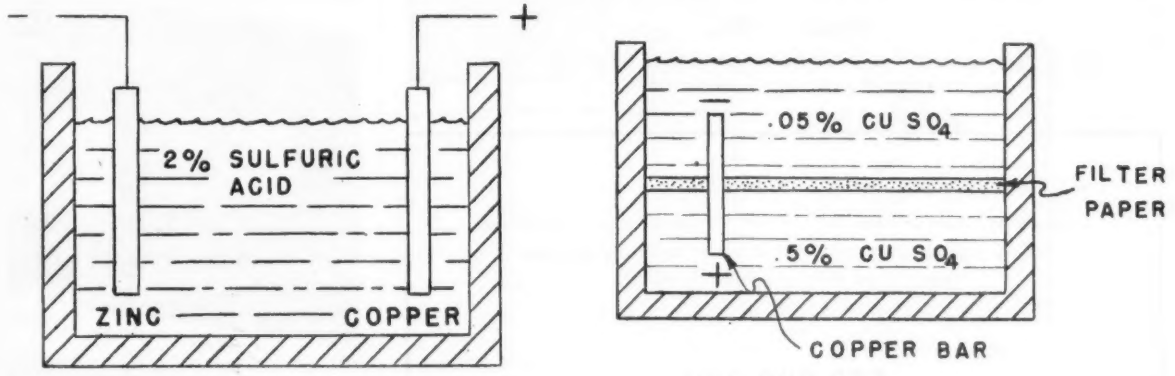


Fig. 1—(Left, above) Principle of simple galvanic cell. When the electrical circuit is closed copper is completely protected, while zinc goes into solution

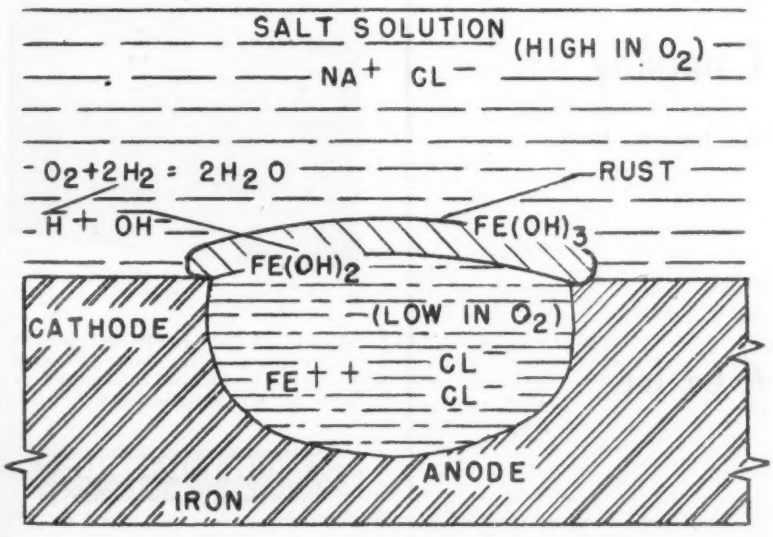
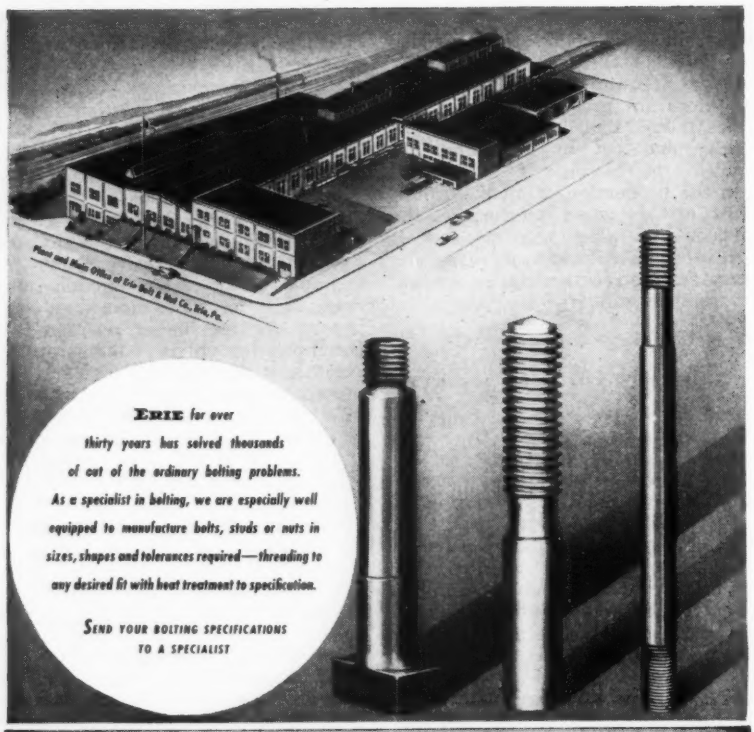


Fig. 2—(Right, above) Principle of metal ion cell. Copper corrodes in the dilute solution and plates out in the concentrated solution

Fig. 3—(Left) Principle of oxygen concentration cell. Dissolved oxygen combines with the hydrogen produced at the cathode, while hydroxide ions unite with the iron ions formed at the anode to give a precipitate of iron hydroxide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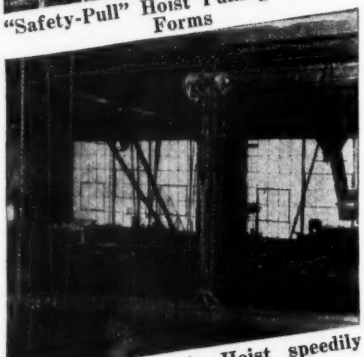

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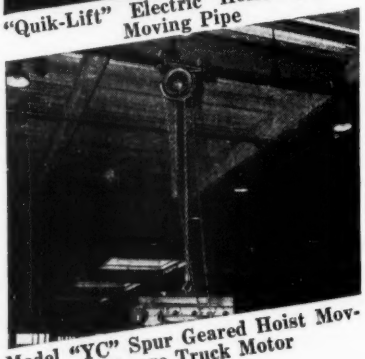

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The critical flow velocity at which corrosion-erosion becomes severe on a particular material is dependent on the temperature and the fluid itself. The effect of velocity on the corrosion of steel in 100 per cent sulfuric acid at 77° F. is a striking example. At zero and at 3 ft. per second flow velocity the corrosion rate was zero. At a velocity of 2 ft. per second the corrosion occurs at the rate of 3 in. per year. Other corrosive agents may require much higher velocities.

Effect of concentration.—As a general rule the rate of corrosion increases with increasing concentration of the corrosive agent. For example, a very weak hydrochloric acid will not attack iron as rapidly as a stronger solution. Unusual behavior not following this rule is often explainable on the basis of the film formed. Lead is satisfactorily resistant to the lower concentrations of sulfuric acid, but is not satisfactory for 95 per cent acid because the lead sulfate formed on the surface is soluble in concentrated sulfuric although insoluble in dilute acid. Plain steel is rapidly corroded by dilute sulfuric, but is not corroded by the stagnant 95 per cent acid at room temperature. This is caused by the protective film which remains on the surface of the iron in the stronger acid. These anomalies are interesting because they point the way in combating corrosion and in selecting proper materials.

Electro-Chemical Factors

Pitting and the corrosion-erosion mentioned previously are particularly serious because the damage becomes so localized. In view of their importance the different mechanisms contributing to it need further attention. Two types of pitting are distinguishable. The first type is the cavitation of pump impellers and the corrosion-erosion occurring upon exposure to fluids under high velocity. The second type has resemblance to a battery in which the corroded region is one pole, while the uncorroded is the other. Four kinds of cells will be examined.

Simple galvanic cell. — The first and most easily understood is the simple galvanic cell. Fig. 1 shows the simple cell in which sulfuric acid is the corrosive agent. As long as both copper and zinc are unconnected, both will corrode (although the copper will not corrode at as high a rate as the zinc). When the electric circuit is completed the copper will be completely protected as long as a moderate amount of zinc still remains.

Instead of a battery jar with the zinc and copper, the case may be a piece of steel with a little spot of copper welded on it, with the specimen immersed in a pool of aereated brine. The copper will be largely protected, while the steel will corrode faster than if the copper were not there.

Metal ion concentration cell is a second type encountered in corrosion. This depends upon the difference in concentration to produce corrosion. In the cell shown in Fig. 2 the bar of copper would corrode at the top, while copper would be plated out at the bottom. In the particular cell illustrated there is no over-all loss of metal, although the metal is becoming thinner at one spot.

In most practical cases of corrosion, some corrosive agent is present to cause the metal ion concentration in the first place. Usually, then, at the location of the metal ion cell, enough corrosive agent is present to prevent appreciable quantities of metal from plating out. The tendency to plate out still remains as a factor in the process of corrosion.

Oxygen concentration cell.—Fig. 3 shows an oxygen concentration cell. Instead of deriving its major force from the difference in metals or difference in concentration of metal ion, this cell depends on difference in oxygen concentration. The interior of the pit is shielded from oxygen by the layer of iron hydroxide precipitate, while the region outside the pit and rust layer is relatively open to oxygen, which has dissolved in the water.

Comparing Figs. 2 and 3, it is seen that the oxygen concentration cell also has a metal ion concentration cell included—the metal ion concentration being greatest in the pit and lowest outside of the pit. This metal ion cell may oppose the oxygen concentration cell and so stifle the action, especially on copper alloys.

How do oxygen concentration cells get started? A piece of dirt on the surface may shield a small section, which then becomes the anode. Or a simple galvanic cell may start a pit which then progresses as an oxygen concentration cell because the oxygen concentration is low at the bottom of the pit. No matter how clean the surface of a metal, as long as a corrosive agent is present corrosion will eventually start.

An additional factor aggravates corrosion by oxygen concentration cell. Some materials — particularly stainless steel—form an oxide layer. This can become more cathodic than the metal itself. Thus the voltage and corrosiveness of the cell are increased. Metals that do this are particularly prone to pit easily and rapidly, especially in presence of chlorides.

It is interesting to note that in neutral solutions the edge of the oxygen concentration cell will be alkaline. This is the result of oxygen removing the acidic hydrogen ion and thus leaving the solution at that point alkaline. Paints used to protect metal in neutral solutions must consequently be alkali resistant.

Stray-current cell depends upon an external supply of current. The current may result either from corrosion or d.c. electrical machinery. Stray currents, because they add energy to the system, can cause many different reactions. The corroding region is ordinarily where the current leaves the metal, the sign of this point being positive. Steel is attacked by stray currents where the current leaves the metal (positive pole), but some metals like lead can be attacked at either the negative or positive pole. Stray current corrosion may cause general or pitting attack. In buried pipe, pitting seems to be the usual manner of failure.

Action of Acids

Metals in contact with aqueous solutions, like pure water, sodium hydroxide, and hydrochloric acid, tend toward equilibrium with a definite concentration of hydrogen which results from the reaction of the metal with the solution. If the equilibrium amount is greater than that which can dissolve in the solution, hydrogen bubbles are evolved.

Iron first evolves molecular hydrogen bubbles when the hydrogen ion is up to the concentration found in 0.000037 per cent hydrochloric acid (pH of 5). Copper does not evolve hydrogen bubbles until the acid concentration is much greater. At room temperature copper requires hydrochloric acid of approximately 38 per cent strength. At a temperature of 170° F. hydrochloric acid of 32 per cent strength is required. The tendency to evolve hydrogen is in the following order, the metal with the greatest tendency being at the top and others with decreasing tendency in their relative positions:

1. Sodium	8. Tin
2. Magnesium	9. Lead
3. Aluminum	10. Copper
4. Zinc	11. Silver
5. Iron	12. Mercury
6. Cadmium	13. Platinum
7. Nickel	14. Gold

Whether or not a metal does give off hydrogen bubbles is dependent not only on the acidity (hydrogen ion concentration), but also on pressure, temperature, film formation, and still others. Film formation is particularly important and is frequently found in connection with many metals.

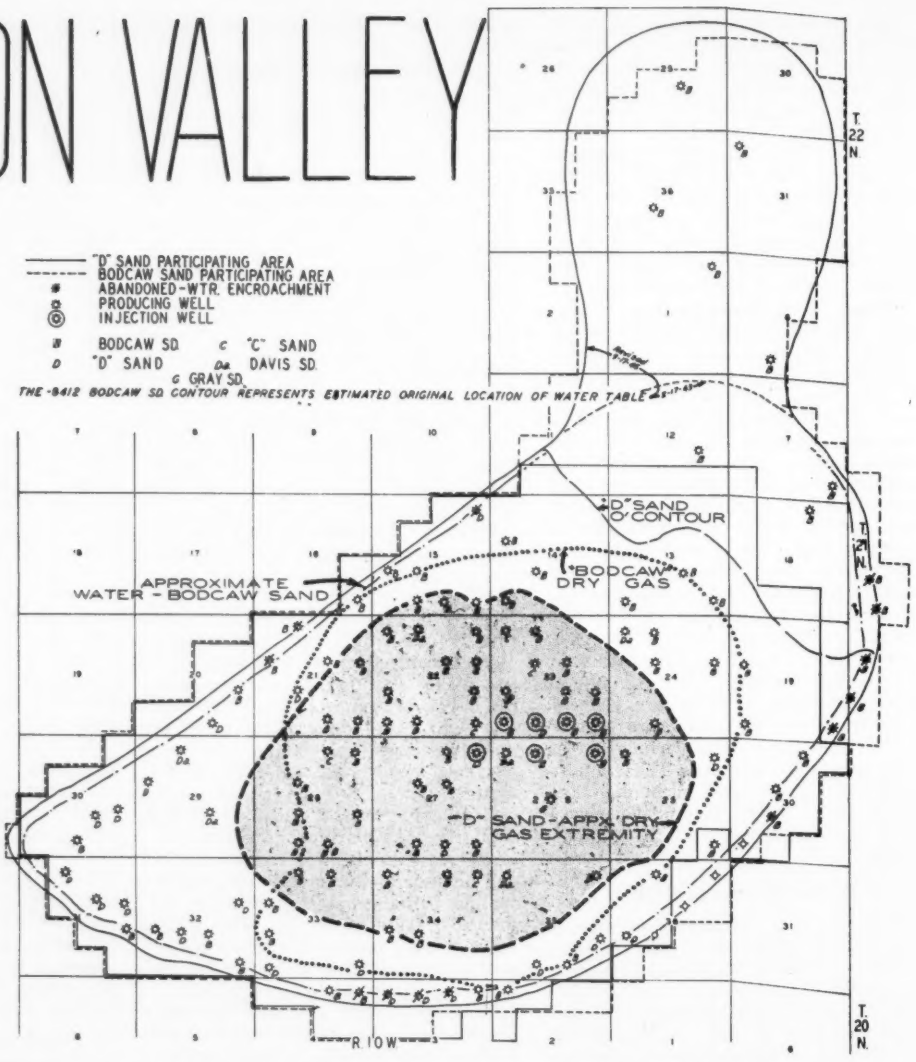
The series may be in entirely different order with fluids other than water solutions. Even in aqueous solutions some curious changes may take place with elements changing positions drastically.

Visible bubble evolution is not the only way in which hydrogen may be removed from the solution. Oxygen from air in contact with the solution may combine with the hydrogen—as it does in the oxygen concentration cell. In this way iron and copper can be corroded in very weak acid and even alkaline solutions.

COTTON VALLEY

Five Years Later

by George Weber



Map showing present status of the Cotton Valley field, Webster Parish, Louisiana

IN May 1946 the Cotton Valley Operators Committee completed its fifth year of unitized cycling operations in the Cotton Valley field of North Louisiana. As one of the earliest projects of its kind, now approaching the halfway mark, the operation affords a valuable history of the benefits of unitization and the practices involved in pressure maintenance.

The period embracing the war years was one of assured maximum demand for its products and Cotton Valley produced at full capacity contributing substantial quantities of raw materials for explosives, aviation gasoline, and synthetic rubber. Currently operating at about 75 per cent capacity, the project will be subject to future market demand for its wide variety of products both in the rate of its throughput and the extent of its economic life.

Like many early developments of its kind, Cotton Valley does not represent an ideal cycling operation. Before any gas was injected, over 94 billion cubic feet had been withdrawn together with over 9½ million barrels of condensate and oil. This production prior to cycling resulted in a 700-lb. reduction in pressure in the principal reservoir with an indicated loss of 13 million barrels of liquid hydrocarbons by retrograde condensation in the formation. Before unitization, the field was overdrilled to the extent of about $5,000,000 in needless expenditure. Furthermore, factors beyond control of the operators committee have prevented maximum maintenance of reservoir pressures during the 5 years of operation.

But in spite of its late start and the continuous compromise which engineers must make with ideal practice, the project has proved outstanding as an example of conservation and sound investment. Economically, the unit has fared even better than

The author, district editor at the Journal's Dallas office, developed some of the first comprehensive material on cycling operations that appeared in a technical petroleum publication. Six of his articles on this subject appeared in the Journal in 1939, seven in 1940, and four in 1941, including the detailed account of the big Cotton Valley project at the time of the completion of the plant and its initial operation, in the special Journal section of July 10, 1941. During the war Weber was a major of artillery for 4 years in the Pacific theater, participating in the Philippine liberation. One of his first undertakings this year was to visit Cotton Valley and obtain intervening operational data and results for this follow-up article.

anticipated at the beginning of operations in 1941. Gross income from the sale of plant products, stock-tank distillate, and gas for the 5-year period more than doubled total physical investment in wells, field lines, and plant. Discounting the benefits of added recovery which will accrue as the project approaches its extended limit, the investors' position at the half-way point has improved manyfold. Under conditions existing before the unit agreement was formed, it was believed that many leases in the field would fail to pay out the investment.

From an engineering standpoint, the field had served as an ideal laboratory for study of pressure maintenance and attendant techniques. Committee engineers have taken advantage of conditions unique to Cotton Valley in making practical contributions to current knowledge of reservoir performance, well testing, well sampling, corrosion and plant operation.[1]

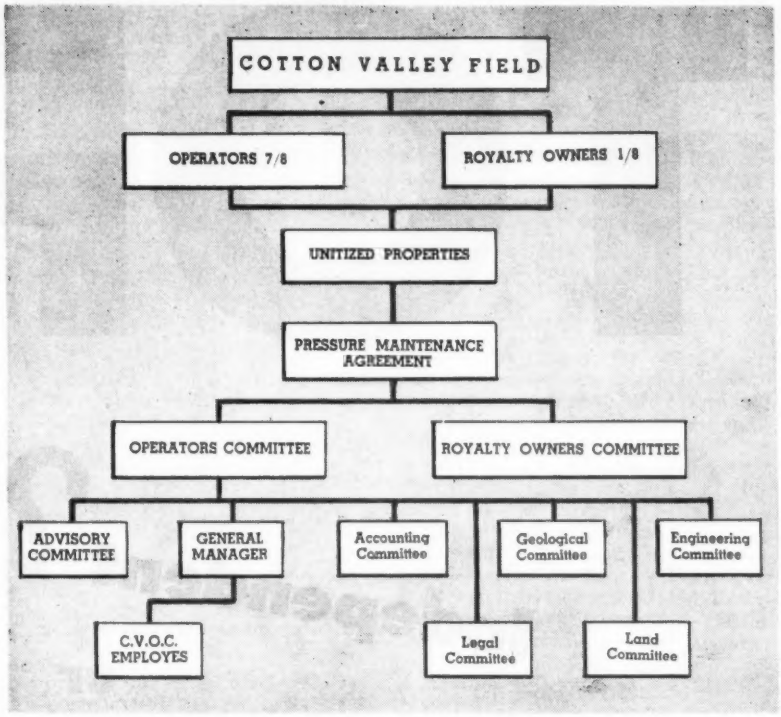
The Field

Cotton Valley is an elongated anticlinal structure. Shallow production was first discovered in 1922, followed by development of minor reserves in the Tokio, Rodessa, and Travis Peak formations. Deep exploration in 1937 reached the first production in the Cotton Valley formation of Upper Jurassic age and drilling during the subsequent 3 years proved major reserves of oil, gas and condensate in several sands of the formation.[2]

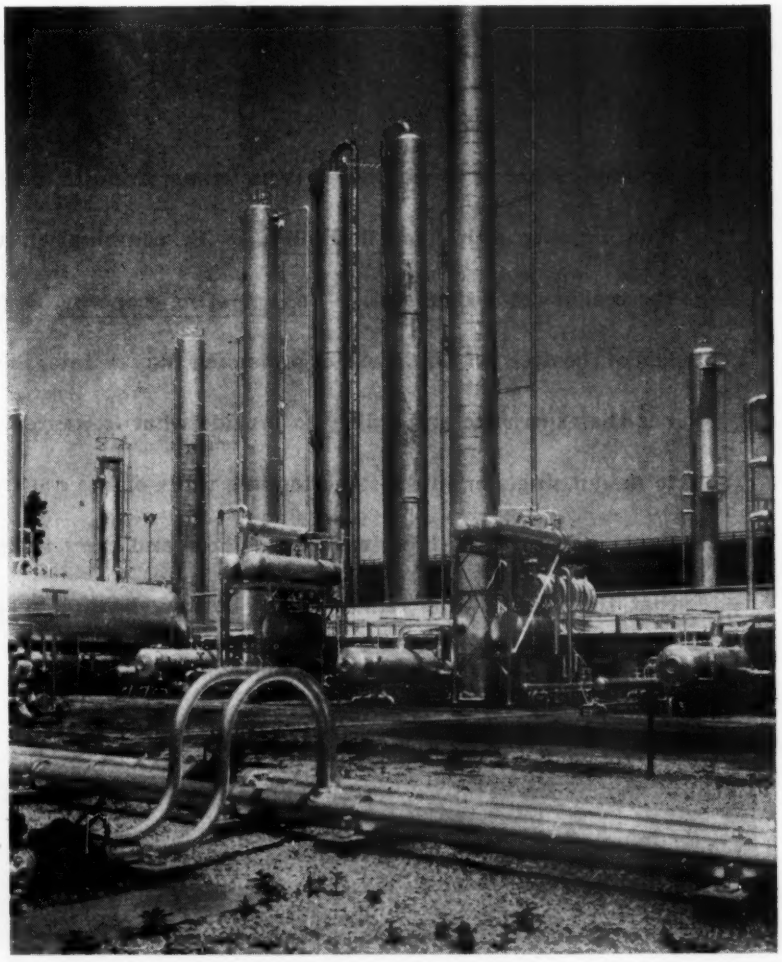
Current withdrawals from the formation come from six sands encountered below 8,000 ft. Listed in descending stratigraphic order they are: the "C," "D," Bodcaw, Pardee, Davis, and Gray. All sands but the Pardee produce gas and condensate and are now unitized. Characteristics of four of the five unitized sands, and the summary of field development are shown in Tables 1 and 2. Limited exploration during the war extended the Bodcaw sand on the north by 4,000 acres, increasing estimated reserves in that sand by 10 per cent. The Gray sand, discovered since the field was unitized, produces from a single well, and little is known concerning it at this time.

During the early months of deep Cotton Valley development, relatively little was known regarding the high-pressure gas-condensate production. Wells produced at extremely rich liquid ratios and drilling ac-

(Continued on page 99)



Organization chart of the Cotton Valley Unit



Plant additives during the first 5 years of operation have improved recovery to such an extent that losses from declining pressure have been largely offset. This view shows the two twin toluene columns, now used as gasoline fractionators, flanked on the left by a primary column and deethanizer, and on the right by a splitter column and debutanizer

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TABLE 1—SUMMARY OF SAND DATA AND CORE ANALYSIS

Sand—	"C"	"D"	Bodcaw Original	Bodcaw N.E. extn.	Bodcaw Total	Davis
Footage analyzed	9.0	444.6	881.0	57.3	938.3	20.5
Weighted avg. porosity, per cent	11.7	16.0	16.3	15.0	16.2	11.3
Weighted avg. permeability, md.	6.5	139.6	141.5	50.5	136.0	44.5
Maximum permeability, md.	10.0	1,120.0	865.0	500.0	865.0	393.0
Minimum permeability, md.	0.0	0.0	0.0	0.0	0.0	0.0
Connate water at avg. permeability, per cent	28.6	25.4	25.4	25.9	25.4	26.0

TABLE 2—SUMMARY OF DEVELOPMENT AT COTTON VALLEY

Sand—	"C"	"D"	Bodcaw Original	Bodcaw N.E. extn.	Bodcaw Total	Davis	Total
Total wells	5	25	87	5	92	4	*127
Potential producers	5	19	27	5	32	4	*61
Flooded by water	0	3	9	0	9	0	12
Flooded by dry gas	0	1	45	0	45	0	46
Injection wells	0	2	6	0	6	0	8
Total productive acreage	(†)	11,432	14,441	3,854	18,295	(†)	....
Avg. sand thickness	0-5	7.9	27.1	11.5	23.8	0-18	....
Original reserves billion cu. ft.	10	91	....	....	510	125	736
Original reservoir pressure, psig.	4,000	4,000	....	....	4,000	4,580	....
Original reservoir temp., °F.	238	238	....	....	238	240	....
Reservoir pressure 3-1-46, psig.	2,030	2,667	....	....	2,932	3,506	....
Reservoir pressure at commencement of cycling	....	3,130	....	....	3,215	....	....

*Includes one Gray sand well. †Insufficient data.

TABLE 3—CALCULATION OF PARTICIPATION IN PLANT PRODUCTION

Participating sand—	Total wet gas prod., M.M.c.f.	Theoretical yield, bbl./M.M.c.f.	Theoretical bbl.	Theoretical per cent	Actual plant prod.
Bodcaw	2,134	75.84	161,797	66.247	172,625
C	51	55.00	2,822	1.155	3,010
D	455	79.44	36,088	14.776	38,503
Davis	500	75.42	37,733	15.450	40,259
Gray	121	48.00	5,792	2.372	6,181
Total	3,261		244,232	100.000	260,578

tivity flourished throughout the field, on 40 and 80-acre units. As operators learned more of the nature of their production they realized that they faced limited oil recovery from the field's narrow rim, and steadily diminishing condensate yield from the remainder of the reservoirs; a depressing prospect to many who had invested heavily in deep wells.

The prospect of unitization and pressure maintenance was promptly proposed and committees were formed by company engineers, geologists, and attorneys in 1938 to begin the groundwork for the project. The following 2 years were spent in compiling basic data and writing an agreement which incorporated terms acceptable to 90 per cent of all operators and royalty owners owning interest in the deep production. With little precedent to follow, committee members determined the equities of 30 operators and over 600 royalty owners in sands producing both gas and oil, and programed unitized operations covering known reserves and added reserves which might be discovered in the future.

The Cotton Valley Unitization and Pressure Maintenance Agreement, made effective June 29, 1940, by 90 per cent of all parties concerned, was supported by the state when the Louisiana Department of Conservation in early 1941 enforced 100 per cent participation in the project. The state's action was authorized by a law permitting such action in the interest of conservation. The work of the several committees was taken over by the new operators committee as soon as the agreement became effective, and under the committee's supervision a 150,000,000-cu.-ft. cycling plant was constructed and placed in initial operation in May 1941.

Unit Agreement

An outstanding record of cooperation among the interests at Cotton Valley is largely responsible for the unit's smooth and efficient history. The absence of serious differences after 5 years of operation may be attributed to the comprehensive agreement which is the bisis for the entire project.[3]

Unlike most units of its kind, Cotton Valley is operated not by a company member of the agreement, but by the operators' committee itself, which is designated sole agent for all participants. In that capacity it is authorized to produce and process any or all unitized substances, to maintain reservoir pressures in conformance with best possible engineering practices, with delivery of products to the operators or their designated agent.

Each operator signing the agreement is represented by one member on the operators' committee. Decisions are reached by a majority vote of acreage and concurrence by at least seven members. The committee employs all personnel necessary for the unit's efficient operation, headed by a general manager. The administrative structure of the unit is outlined in an accompanying figure.

Originally the agreement defined two participating areas, for the Bodcaw and "D" sands. Both areas were fairly well defined by extensive drilling, but provisions were made for inclusion of any outside acreage proving productive in the future. All members agreed to unitize into additional participating areas equal to the Bodcaw in area, all oil or gas reserves discovered below the base of the Travis Peak formation, with the aforementioned exception of the Pardee sand. Accordingly, during the past 5 years, the Bodcaw Participating Area has been extended to include newly proven reserves, and the Davis, "C" (coincides with "D" sand) and Gray Sand Participating Areas, coinciding with that of the Bodcaw, have been formed.

Participation in plant cost, operating expenses, and returns from sales of gas and plant products is determined on a straight acreage basis. Each participating area is allocated its percentage of total production from the unit on the basis of theoretical yield of product from actual gas produced from the respective sands. For example, participation in total plant production of 260,578 bbl. for May 1946 was calculated as shown in Table 3.

Each tract in each participating area is in turn allocated a fraction of that area's production on an acreage basis. During May, the "C" and "D" sand was unitized over 12,092.9 acres and each of the other areas covered 15,978.614 acres. Therefore, as a specific example, an 80-acre tract included in all participating areas would receive: 80/12,092.9 × 38,503 or 254 bbl. from the "D" production, 80/15,978.614 × 172,625 or 866 bbl. from the Bodcaw, etc. Participating areas may increase but will never be reduced in size, since the agreement stipulates that no acreage once included in participation shall thereafter be excluded.

Each operator receives his share at the production allocated to his tract, which he separately sells and he is separately liable to make all payments to royalty owners on such production. In addition, each operator is liable for payment of all severance, production, or other similar taxes levied on the basis of production allocated to his acreage. Employes of the Cotton Valley Operators Committee act only as a delivery agent insofar as sales transactions involving gas or liquid products are con-

AN OPEN LETTER TO THE INDEPENDENT REFINER

Although the exporting of oil is now at an all time high, it should be carefully noted that the great bulk of these exports are initiated and controlled by the "Big Seven" operating from the U.S.A., Venezuela and the Near East. The "Big Seven" know the value of export business, know that even a little inroad in the foreign market today may mean a substantial part of their business in the future.

There is no doubt that your entire production can, today, be sold in the home market. However, if you have an eye to the future you should take a lesson from the "Big Seven" and get in on the ground floor of export business. Now, right now, is the time to lay the foundations of export inroads. Now, right now, is the *logical time to make certain you have the foreign market to count on for continued and expanded business.* Now, right now, is the time to acquaint importers and consumers with your qualities and brands.

You, as an independent refiner, know the value of safeguarding continuous operations and know that a steady output will insure reliable employment and increased earnings. If you desire any future export business, you should decide now to *allocate a small percentage of your output for export,* to lay the foundations of a planned distribution on a world-wide basis. Now, today, is the logical time to consider future sales expansion via the export market.

HERE'S WHAT WE CAN DO FOR YOU. We are prepared to offer you a complete foreign marketing service for your products, relieving you of all risks and expenses. Through our world-wide contacts with our agents, customers and government buying agencies, we maintain continuous relations with the overseas market. We can quickly advise refiners on how much heavy fuel can be absorbed, for instance, by Switzerland, aviation gasoline by Sweden, kerosene by Holland, solvents by Belgium, waxes by Italy, lubricants and petroleum coke by France, white oils by Turkey and India, insecticides by Morocco, etc. WE HAVE THE FOREIGN CLIENTS . . . YOU HAVE THE PRODUCTS . . . LET US WORK TOGETHER. WRITE FOR DETAILS TODAY.

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AVIATION GAS, CHEMICALS, CRUDE OILS,
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cerned. The bookkeeping department at the plant office computes the quantities of each operator delivered for sale and the purchasers make payment direct to the company members participating.

Wells drilled prior to untization were evaluated at $100,000 each when 7-in. casing was set, and $75,000 each with smaller casing. Each operator originally owning one or more unitized wells was reimbursed for their transfer to the committee in the proportion that the operator's well or wells bore to the aggregate, by an allocation of 80 per cent of seven-eighths of all unitized substances sold. All wells now unitized have been paid out in this manner, after which production was allocated as at present.

A total of 4 Bodcaw and 17 "D" sand wells producing at gas-oil ratios of less than 10,000 cu. ft. per bbl. when the unit was formed, later exceeded that ratio and under agreement terms were included with their respective acreage in participating areas. The same valuation as above was allowed subject to deductions on the bases of time elapsed since original unitization, and production performance if below a set standard. Outside acreage included with these former "rim oil" wells and acreage added by reason of extension of production was unitized upon a fixed payment per acre made by the operator to the committee to cover his share in plant costs. Such payments were also subject to corrections based on time elapsed since original unitization. Participation in production for such additions is not retroactive.

Sole rights to drill and explore below the base of the Travis Peak formation are vested in the operators' committee inside all participating areas. A few wells were drilled during the past 5 years and as restrictions on materials are eased further exploration of the Davis and Gray sands is projected and a deep test to the Smackover lime formation has been voted by the committee.

Production History

Cumulative liquid production from the five unitized sands at Cotton Valley totals nearly 31 million barrels. Prior to cycling, as shown in Table 4, a total of over 9½ million barrels of oil and condensate were produced together with an estimated 94 billion cubic feet of gas.

Five years of pressure-maintenance operations netted a total liquid production of 21,170,992 bbl. comprising 15 plant products. Total unitized gas production from all five sands during cycling was 294,200 million cubic feet as against injections totaling 197,395 million cubic feet, setting net gas withdrawal at about one-third of gross gas produced.

For each 1-lb. drop in reservoir pressure before cycling, about 8,100 bbl. of Bodcaw condensate and oil were recovered. For the 5-year cycling period, total liquid plant production plus oil and condensate recovered from the same sand totaled approximately 50,000 bbl. per 1-lb. decline in reservoir pressure. For the "D" sand reservoir, the same index before and after cycling increased from 3,740 to 9,350 bbl. per 1-lb. decline in reservoir pressure. Both better maintenance of reservoir pressure and improved recovery from produced gas contributed to the differences. The graphic history of Cotton Valley operations from discovery to the present is shown in an accompanying chart, based on figures of the predominant Bodcaw sand.

Financial Position

The first 5 years of operation find the project in a strong financial position. Several factors brought this about. In the first place the bulk of investment in the unit was made at low cost in comparison with many like installations. Improvements in plant design to produce more finished products during a strong demand period also played a major part in increased returns, and continued operation at rates approaching maximum capacity reduced overhead per barrel of plant product and hastened plant pay-out. Gas sales have bolstered income during the past and will become more important as the Bodcaw and "D" zones approach the end of the cycling stage.

During the period from June 29, 1940, to April 1, 1946, gross income from all sales totaled $34,750,000. The total investment in plant, gathering system, and additional wells for the same period was $4,800,000. Operator members have been paid $10,800,000 for wells unitized and turned over to the operators committee. During the same period, total unit expense has averaged 11.8 cents per barrel of liquid product and 7.6 cents per dollar gross income. All figures are before taxes.

Unit Operation

The operating plan at commencement of the project called for cycling all gas in the Bodcaw and "D" sands over a period of about 8 years. Five years of operation at near plant capacity finds 50 per cent of the Bodcaw reservoir and 60 per cent of the "D" sand occupied by dry injected gas. (See accompanying chart.) The Bodcaw extension and discovery of added reserves in other sands have added about 2 years to the life of the cycling project, and gas injection will continue, discounting further discovery, for probably another 5 years although at a diminished rate. Additional reserves may extend operations indefinitely. The Davis sand will undoubtedly figure largely in projecting plans for Cotton Valley as the Bodcaw and "D" sands approach depletion of wet gas. Due to their erratic characteristics, the "C" and Davis sands are not considering cycling projects. The Gray sand will be further investigated for cycling possibilities when it is again possible to resume deep drilling in the field. The sand is still relatively an unknown reserve, but the fact that wellhead pressure on the lone producer has not decreased perceptibly after withdrawal of over 3 billion cubic feet of gas, indicates a larger reserve than originally anticipated.

Recovery Estimates

Deeper exploration over the structure, particularly to the Smackover lime, may bring to light still more reserves which would influence fu-

TABLE 4—SUMMARY OF PRODUCTION AND INJECTION: BODCAW, "C," "D," DAVIS AND GRAY SANDS

	Prior to unitization				Interim	Cycling						
Gas, M.M.c.f.:	1937	1938	1939	1-1-40 to 7-1-40	7-1-40 to 5-1-41	5-1-41 to 1-1-42	1942	1943	1944	1945	1-1-46 to 5-1-46	Total
Prod. other operators	8,613	21,185	22,781	16,333	9,362	6,755	.....	.....	.....	.....	.....	85,029
Prod. C.V.O.C.	.....	.....	.....	.....	16,048	33,318	67,736	62,986	60,730	54,036	15,394	310,248
Prod. total	8,613	21,185	22,781	16,333	25,410	40,073	67,736	62,986	60,730	54,036	15,394	395,277
Injected, residue gas plus propane	.....	.....	.....	.....	.....	27,982	46,658	42,620	38,887	31,908	9,340	197,395
Liquid, bbl.:												
Other oper. stock tank dist.*	646,000	1,500,000	1,329,000	713,000	.....	.....	.....	.....	.....	.....	.....	4,188,000
Other oper. rim oil†	.....	172,116	1,110,826	1,068,272	1,827,360	1,056,061	.....	.....	.....	.....	.....	5,234,635
Total other operators	646,000	1,672,116	2,439,826	1,781,272	1,827,360	1,056,061	.....	.....	.....	.....	.....	9,422,635
C.V.O.C. stock tank dist.	.....	.....	.....	.....	1,273,957	.....	726,721	696,038	198,044	84,194	.....	2,978,954
C.V.O.C. rim oil	.....	.....	.....	.....	.....	.....	‡374,335	‡141,021	.....	.....	.....	515,356
C.V.O.C. plant production	.....	.....	.....	.....	.....	2,022,718	3,655,160	3,535,320	3,993,841	3,511,287	1,176,252	§17,894,578
Total C.V.O.C.	.....	.....	.....	.....	1,273,957	2,022,718	4,756,216	4,372,379	4,191,885	3,595,481	1,176,252	§21,388,888
Total all liquid prod.	646,000	1,672,116	2,439,826	1,781,272	3,101,317	3,078,779	4,756,216	4,372,379	4,191,885	3,595,481	1,176,252	30,811,523

*Stock tank distillate is liquid produced in excess of 10,000 cu. ft. per barrel not processed in extraction and absorption units. †Rim oil is liquid produced at less than 10,000 cu. ft. per barrel and contains oil and condensate. ‡Mixture of oil and condensate produced for four operators by special agreement. §Includes 104,250 bbl. propane.

ture plans. But even were such factors known at present, the continuance and culmination of the project would still be subject to an unpredictable future market for products. It is believed that recovery of light ends from enriched Bodcaw and "D" sand injected gas after normal cycling ceases is definitely feasible. As such injected gas is reproduced it will be processed before delivery to pipe lines. This possibility of recovering some of the condensate originally believed lost in the formation, plus the planned extraction of liquid fractions from uncycled sands in the field, precludes current predictions either of ultimate reserve recoveries or economic limit to field operations. Cotton Valley presents a definite demonstration that cycling operations, however planned from an engineering standpoint, are still largely influenced by economics.

Original reserve estimates of gas in place, shown in Table 2, represent good agreement between pressure-production and pore volume calculations for the Bodcaw and "D" sands. Liquid estimates based on a reservoir study of the Bodcaw sand made last year show the following figures on that sand: indicated initial content (of recoverable condensate at initial reservoir pressure) 43,961,000 bbl.; indicated recovery prior to cycling, 7,431,000 bbl. of butanes plus; actual recovery of stock-tank distillate prior to cycling, 5,438,000 bbl. The discrepancy between the last two figures is accountable in loss of light ends in field separators and stock tanks. Cycling with complete pressure maintenance in the Bodcaw reservoir would have facilitated recovery of an estimated 30,971,000 bbl. of butanes and heavier.

Under the actual cycling program, past and predicted, a butane-plus recovery of about 27,462,000 bbl. is anticipated from the Bodcaw reservoir, subject to the economic qualifications outlined above. The recovery of the same product without pressure maintenance would have varied between 17,953,000 and 23,318,000 bbl. assuming abandonment pressures of 800 and 0 psi., respectively. All figures given here assume 100 per cent recovery. Some measure of the conservation obtained by the present program is seen in the indicated recovery of from 4 to 10 million barrels of additional liquid over estimated recoveries without pressure maintenance at abandonment pressures of 0 and 800 psi., respectively.

Sufficient information for estimating recoveries from other sands is not available, but the observations regarding the Bodcaw may be considered analogous to the "D" and Davis sands.

Reservoir-Pressure Trends

Throughout the operation to date, committee engineers' efforts toward maximum conservation have been impeded by a shortage of residue gas for injection purposes. The high product yield averaging 85 bbl. per million cubic feet from both the Bodcaw and "D" sands during the period has made shrinkage loss excessive for a cycling operation.

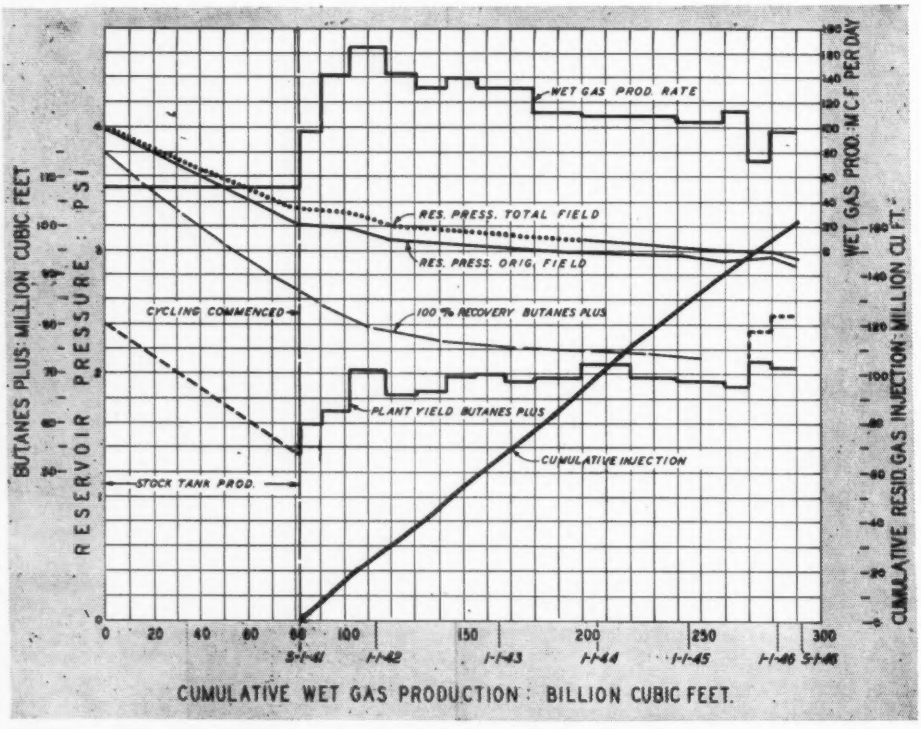
The resulting pressure decline during cycling has caused a gradual reduction of liquid-gas ratios from producing wells, although improved plant efficiency has partially offset such losses. The most serious effect of pressure decline on actual cycling operations is felt in water encroachment on the flanks of both cycled sands (see map). The water front is moving slowly and may be expected to continue so long as the differential between original and current reservoir pressures exists. To date a total of three "D" and nine Bodcaw wells have been flooded by the water advance.

Flank water threatens the cycling program more critically in the "D" sand, due to the edge location of most of the producers from that sand. If such wells, originally drilled along the structure's rim for oil, are allowed to flood before cycling is complete, it is estimated from electrolytic model studies that the reservoir volume displaced by dry gas may be reduced from 90 per cent to between 80 and 85 per cent. Maintenance of the present pressure, averaging 2,667 psi., is believed sufficient to arrest the water advance to so slow a rate that the wet "D" sand gas may be displaced before critical production wells are flooded by water. Accordingly, plans provide for a zero net withdrawal from the "D" sand in future production and injection schedules.

The Bodcaw reservoir is not so seriously threatened since withdrawal wells are located higher on structure. So net withdrawals of gas from that sand must be tolerated since gas to maintain both reservoirs is not available.

In addition to the losses entailed in wet-gas displacement, the flooding of edge wells will deprive the operators' committee of some of the field's richest oil producers. "D" sand wells, in particular, are still producing some oil mixed with gas and condensate from flank locations. This oil is believed irrecoverable if such wells are lost.

In planning production and injection schedules for the two sands, engineers have been aided by a large number of wells from which to choose. While this does not justify the cost of wells which were


WET GAS PROD. RATE
RES. PRESS. TOTAL FIELD
RES. PRESS. ORIG. FIELD
CYCLING COMMENCED
100 % RECOVERY BUTANES PLUS
PLANT YIELD BUTANES PLUS
CUMULATIVE INJECTION
STOCK TANK PROD.
BUTANES PLUS: MILLION CUBIC FEET
RESERVOIR PRESSURE: PSI
WET GAS PROD: M C F PER DAY
CUMULATIVE RESID GAS INJECTION: MILLION CU FT.
0 20 40 60 80 100 150 200 250 300
5-1-41 1-1-42 1-1-43 1-1-44 1-1-45 1-1-46 5-1-46
CUMULATIVE WET GAS PRODUCTION: BILLION CUBIC FEET.

Production history of the Bodcaw sand

drilled before unitization became effective, the situation does allow a flexible program for cycling and will result in increased recovery of wet gas. The original plan was based on electrolytic model studies checked periodically by well tests. The possibility of gaining maximum dry gas sweep through the reservoirs gives engineers a sound basis for estimating that 80-90 per cent of Bodcaw and "D" wet gas may be brought to the surface. A recovery of 70 per cent is assumed as average by many cycling operators in other fields.

Current operations require a small fraction of available wells. Dry gas is being injected into 6 Bodcaw and 2 "D" sand wells and production is withdrawn from 21 Bodcaw wells, 7 "D" sand wells, 4 Davis sand wells, 3 "C" sand wells and the single Gray sand well.

Dry Gas Volume

Many of the estimated 50 wells needlessly drilled before cycling commenced have served in the study of the dry-gas advance from the injection area at the top of structure. Most of the wells already flooded by injected gas were completed in the Bodcaw sand, and their use has afforded a check of theoretical displacement never before possible on such a scale. In shape if not in size, the dry-gas front has followed the pattern indicated by electrolytic studies. In the Bodcaw reservoir dry injected gas now occupies an area of approximately 7,300 acres, estimated to occupy 50 per cent of the reservoir volume. This is roughly 30 per cent greater volume than electrolytic models showed for dry gas at this stage. The injected gas is contained in a definite volume thus far in the displacement program. As it approaches edge wells it will become increasingly sensitive to withdrawal rates in individual wells and a continually closer check will be necessary on production plans to prevent trapping of wet gas. To this date no indication of serious dilution of dry with wet gas has been noted in the extensive field tests of wells in the path of the dry gas front.

The "D" sand reservoir is now about 60 per cent flooded by dry gas (see map). This projection is much less accurate than that shown for the Bodcaw since few "D" sand wells have been engulfed by the injected gas front.

Regular wells testing throughout the field have shown a gradual increase in gas-liquid ratios throughout the 5-year period. The increase is attributed by engineers largely to the retrograde effect accompanying pressure decline, however, and dilution by dry gas is believed a relatively negligible factor. This conclusion is based on the fact that all producing wells in the reservoir show relatively the same rate of ratio change regardless of their position near the approaching dry-gas front or on the extreme flanks of the structure. Wells flooded by the dry-gas advance from the injection area show a sharp increase in ratio change. Trapping of wet gas appears to be extremely low, since wells included in the dry gas area for several months show a wet gas content of approximately 1 per cent by calculation.

Corrosion Problems

One test well is being used in studying the effect of introducing sodium chromate and allied inorganic solutions into the flow stream. Exposure of coupons to production in well head connections is being carried out in conjunction with studies conducted by University of Texas. In addition, coupons are being exposed in all producing wells in the field to determine which wells are corrosive and to what degree.

Corrosion at Cotton Valley is relatively slow, and constant inspection and correction measures have successfully checked serious damage to wells and equipment. The field has no dual completions and thus no hazard to well casing. By use of tubing calipers which were developed at Cotton Valley, it appears possible to predict the need for replacement before tubing actually parts. Surface lines and well-head connections are inspected regularly, using the Penetron instrument, and its employment is being extended to inspection of plant and field flow lines. Line walkers and well checkers make daily inspection of all surface equipment in contact with high-pressure gas so that any incipient leaks may be corrected in the early stages.

Well-Testing Methods

Well testing conforms to standards of the Natural Gasoline Association of America, which were drawn up with the aid of Cotton Valley engineers. A portable test trailer developed in the field takes a sample in a vertical meter run. It has given satisfactory results over a period of several years with accuracy within plus or minus 5 per cent when calibrated with full-scale separator conditions.

In addition, a method for testing low-pressure wells has been devised and is undergoing perfection. Well-test data have been used in calculating plant production over a period of 8 months, with calculated results varying from 1½ to 4½ per cent of actual plant recovery.

Plant Additions

The sustained yield of plant production at declining liquid gas ratios, as shown in an accompanying figure, is due to numerous improvements and additions incorporated in the plant. During 1942 and 1943, plant design was improved by the addition of equipment permitting an increased absorption oil rate, inlet gas coolers, and a recompressor.

The most important addition to plant production was the toluene unit. Interest in the production of vitally needed toluene concentrate began in April 1942 when committee engineers investigated the toluene content of distillate in a routine evaluation, and found results encouraging. Near the end of that year, need for the raw material for explosives became critical and the Government requested the operators committee to install equipment for separation of the product.

The plant was designed and constructed under close supervision of plant engineers, using less than 20 per cent new equipment. Highly efficient fractionation in large columns is necessary to segregate toluene concentrate from other hydrocarbons and two towers, 9 and 10 ft. in diameter and 156 ft. in height, were fabricated from 22-year-old 50,000-bbl. crude storage tanks salvaged from the nearby Haynesville field. The size of the towers required their erection before installation of bubble trays, which were stamped from the same tank steel. Steel sheets from the tanks were again used in fabricating return bends installed in the two old oil heaters incorporated into the unit. Well casing served for lines in some cases, and pipe was mitered for the majority of weld ells.

Accumulator and reboiler shells were formerly beer containers from a Dallas brewery. The floating head exhaust steam condenser was formed from the compressed air tank and pipe from a St. Louis street car. Lengths of 28-in. spiral pipe once used by a Lake Michigan dredge became vapor lines from the columns. Instruments from used stocks and three used oil-field boilers also went into the construction work. Despite the many substitutions and expedients employed, the unit was constructed, tested and inspected satisfactorily under A.P.I.-A.S.M.E. standards.

Although the plant was designed for production of a concentrate containing about 30 per cent toluene and methylcyclohexane, it proved capable of fractionating a 45 per cent concentrate. This improvement reduced transportation requirements and netted additional income to participants in the unit. During the 2½ years of its operation, the plant produced over 600,000 bbl. of toluene concentrate.

Low-Pressure Absorption Added

Second in importance to the toluene addition to the plant was the installation of a central separator battery and sales gas absorber for low-pressure gas produced in the field. When cycling began, many "D" sand wells producing oil on the field rim were still producing at ratios of

less than 10,000 cu. ft. per barrel. Gas from such wells was gathered in the low-pressure system and delivered directly to pipe lines for about 1½ years. Eventually all of the wells exceeded the ratio limit and became gas wells and as such, were included in the unit.

Separation of liquid, still containing much oil, was then centralized in one battery inside the plant and shortly after, all liquid from the 500-psi. separators was charged to the plant proper to avoid stock-tank vapor losses. This program was completed by 1944. Then followed installation of the low-pressure gas-absorber unit which stripped gas sold to all but one pipe-line purchaser, swelling the unit's total gas intake capacity to 180 million cubic feet daily. The unit required additional cooling capacity and increased the plant's lean oil stripping rate to 1,000 g.p.m. During the same period a column was installed for recovery of 35 per cent of propane, augmenting plant output by 1,700-1,800 bbl. daily. Propane sales are particularly dependent upon market demand and excess product is returned to the reservoir with cycled gas.

Changes in Basic Flow

Plant additions have necessitated some changes in basic flow. Total liquid product from absorbers and separators is charged first to the primary column, a depentanizer. Overhead, containing pentanes and lighter, is then deethanized at 400 psi. By first deethanizing and then depropanizing, it is possible, employing refrigeration, to condense the depropanizer overhead and increase the propane yield by about one tank car per day. The depropanized product is charged to the debutanizer and the butane and pentane streams from that column can be split to produce iso and normal butanes and pentanes of 95 per cent purity, in splitter columns.

The former toluene plant, illustrated in the accompanying photograph, is employed in refining the hexane-plus fraction from the primary tower. A 400°-end-point naphtha is taken overhead and side streams yield kerosene, diesel fuel, and residue. The 400°-end-point motor fuel is blended with pentane and the mixture is again blended by proportional control with butanes to obtain vapor pressure ranging from 7-12 lb. The control allows a vapor-pressure accuracy within 0.1 lb. By means of a leased ethyl-blending unit, the operators' committee is able to round out the plant output to include seven finished products. Present rated plant production at a daily input of 175 million cubic feet of gas is outlined in Table 5. A representative material balance shows the following recoveries: propane, 42.6 per cent; butanes, 85.9 per cent, and pentanes plus 99.5 per cent. In 5 years of operation, the plant has produced over 21 million barrels of liquid, numbering 14 products as shown in Table 6.

TABLE 5—PLANT RECOVERY UNDER CURRENT OPERATIONS, BBL.

Propane	1,700
Isobutane	1,000
Normal butane	1,200
Motor fuel	8,000
Kerosene	650
Fuel oil	200
Residue	250
Total	13,000

TABLE 6—CUMULATIVE 5-YEAR PLANT PRODUCTION, BBL.

Propane	276,493
Butane mixture	1,157,059
Normal butane	312,098
Isobutane	751,973
Isopentane	208,367
Normal pentane	239,099
Pentane concentrate	677,804
Toluene concentrate	622,406
Mix. (converted prod.)	12,716,535
Stock tank distillate	3,276,414
Gasoline	794,463
Residue	4,519
Residue-kerosene mix	64,712
Kerosene	59,177
Fuel oil	9,873
Total	21,170,992

References

1. Martin G. Miller and Max R. Lents, "Performance of Bodcaw Reservoir, Cotton Valley Field Cycling Project; New Methods of Predicting Gas Condensate Reservoir Performance Under Cycling Operations Compared to Field Data," presented at Spring Meeting, Mid-Continent District A.P.I., Oklahoma City, June 7, 1946.

2. For further information on Cotton Valley field see The Oil and Gas Journal, July 10, 1941, page 55.

3. For complete details on Cotton Valley Unitization and Pressure Maintenance Agreement, see The Oil and Gas Journal, July 25, 1940, page 168.

4. "Mixing Device for Sampling the Two-Phase Well Stream," by T. W. McGuire, presented before N.G.A.A. meeting at Dallas, April 17-19, 1946.

5. "A Need for a Method of Detecting Internal Corrosion," by T. W. McGuire, presented at the annual meeting of the National Association of Corrosion Engineers, Houston, April 10-12, 1944.

Drilling at Mattoon

(Continued from page 83)

The relatively long time required for completing wells is occasioned partly by the exceptionally large amount of shale in the sands, which after shooting, complicates cleaning out. To complete a well, the bottom sand first is drilled in and shot, cleaned out with sand pump or bailer, and tested. If it is the Rosiclare sand, it may be acidized after cleaned. If this sand is the only one to be produced, the well then is ready to be placed on the pump and completed. If not, a temporary bridge plug is set below the next highest sand to be produced; and the alloy window opened. This sand then is shot, hole cleaned out and tested, after which the bridge is removed, tubing run through to the lower sand, and pump set.

All wells are produced by pumping. A few wells have flowed initially but have had to be placed on the pump in a short time. Individual pumping units are employed except on a few wells having jacks powered from back-crank hookups. Approximately 50 per cent of the wells are electrified, with purchased power supplied from a high-voltage line extending through the field. The remainder of the wells use individual gas engines. For electric power, 7½-hp., 60-cycle, 220/440-volt motors usually are employed.

No Production Separation

Following conventional Illinois procedure, no separation of production is made in multiple-sand wells. The tubing simply is hung in the hole without packers and the production allowed to commingle in the well bore. In a number of instances operators have elected to twin drill their locations instead of attempting dual completions. Under these circumstances, although the sands are produced separately, the production is run together at the surface.

Crude produced in the field runs 38° to 40° A.P.I. gravity and is of intermediate base. Gas production is small, consisting largely of solution gas from the oil. Only the Cypress sand has been found to have a gas cap and this is confined to an area of less than 100 acres in the center of the field. The few wells completed in the Devonian formation have carried fairly high ratios, but none at present is on production. Gas produced from the Rosiclare sand carries some hydrogen sulfide and is unsuited for use. Other gas production, although small, for the present is ample for field operations where needed.

Water has been found in only three Rosiclare sand wells located in an isolated spot on the extreme southeast side of the field. None of the sands has any evident water drive. Field limits on all sides have been defined solely by shaling out of the sands.

BOOKS

TERMINAL AIRPORT FINANCING AND MANAGEMENT. By Lynn L. Bollinger, Alan Passen, and Robert E. McElfresh. Published by Division of Research, Harvard Business School, Boston. 385 pp. $4.25.

This volume is based on an intensive field study of 51 airports and numerous conferences with city and state officials, Civil Aeronautics Administration officials, airline executives, and representatives of various associations in the transportation field. The four parts of the book consider (1) public and private financial responsibilities; (2) present-day capital costs, expenses, and revenues; (3) proposed rate-setting procedure, and (4) management control.

Plant Practices

Mobile Sump Pump

MOUNTED on an all-steel chassis the standard-type reciprocating duplex pump shown in the photograph provides convenience in pumping tank sediment during cleaning operations. Suitable for moving to the job site, the pump may be used also for many other jobs such as transferring the contents of one tank to another in time of emergency or for washing down skimmer-separator walls. Wide-tread steel wheels are used for the trailer which is equipped with a standard hitch for use with any of the refinery vehicles. Flexible hose is used for supplying steam, air, or gas for operating the pump. Suction and discharge of the pump are also connected for operation with flexible hose.

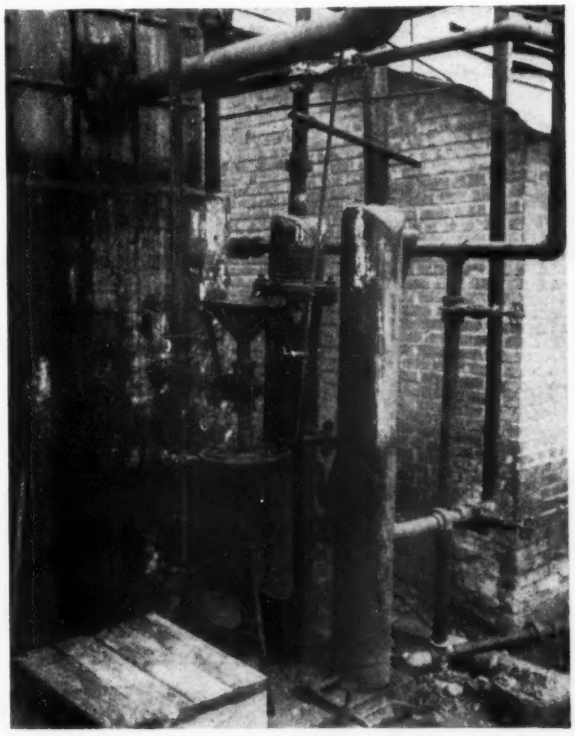
Stand for Remote Control Valves

PHOTO shows a stand with two remote-control valves, for opening release valves on a cracking unit in emergency. One valve stem is merely an extended rod, the other is a chain arrangement. The stand is made of two 30-in. pieces of 4-in. pipe set in concrete; atop the left one is a 4-in. piece of 3-in. pipe, welded on horizontally and extending in the direction of the other vertical pipe (leg). Across the top of the other leg a 3-in. pipe is welded and extending to within about 3 in. of the shorter segment on the opposite leg mentioned above. Through th two horizontal pieces a 2-in. pipe extends, turning freely therein. On the left end of this horizontal 2-in. pipe a crank rod is welded to enable the operator to turn the pipe as desired. A wheel from an old chain hoist is slipped over this pipe, riding between the two sections of horizontal 3-in. pipe, and is welded to the pipe which serves as an axle. The chain runs on this wheel and to a similar wheel connected to a gear arrangement on the valve in the discharge line on the cracking coil 25 ft. away. The other valve-operating setup is entirely independent of the one described above, except that its rod or shaft is supported by passing through a 12-in. section of 3-in. pipe welded atop the horizontal pipe on the frame. The valve wheel, 10 or 12-in. diameter, is fitted to the end of this valve-stem extension, and across this wheel for greater turning leverage is welded a 1-in. pipe 3 ft. long. The stem so rotated turns a worm gear setup for opening or closing the valve.

Mixer for Boiler Water Chemicals

TREATMENT of boiler water often is a continuous operation. Chemicals must be added in proper proportions, and put into solution before addition to the incoming water. The equipment worked out for this job of making solution and adding it to the raw water is as follows:

A 30-in. section of 14-in. pipe has welded into its upper end a flat head cut from steel sheet; a ¼-in. blow-off line is let into this head. The bottom of the container is formed in semiconed shape by cutting out V's, bending inward, and welding. It is supported on three legs of ¾-in. pipe. A ¼-in. steam line is fixed into the bottom. Also in the top is a 2-in. inlet line fitted with a 12-in. funnel for introducing solid or liquid chemicals, with a 2-in. plug valve in this inlet line between drum and funnel. A ½-in. sight glass is fitted in the side of the drum described. Either solution may be made up outside and poured in, or chemicals may be poured in, water admitted and solution thus made. Steam is let in through the ¼-in. line which forces the chemicals at a predetermined rate into the raw water line to mingle with water going to the preheater.



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RESULTS COUNT

Here are typical examples of the effect of Perco Catalytic Desulfurization on lead response:

Straight-run Gasoline: 58° API Gravity; 6-Lb. R.V.P.; 400°F., E.P.

	Undesulfurized	Desulfurized
ASTM Octane No.	53.8	57.8
+ 1 cc. TEL/Gal	59.2	68.9
+ 2 cc. TEL/Gal	63.0	74.1
Total Sulfur, %	0.309	0.017

Straight-run Gasoline: 63.9° API Gravity; 8.4-Lb. R.V.P.; 375°F., E.P.

	Undesulfurized	Desulfurized
ASTM Octane No.	52.0	55.9
+ 1 cc. TEL/Gal	63.0	68.4
+ 3 cc. TEL/Gal	72.2	77.9
Total Sulfur, %	0.069	0.006

Blend Straight-run, Cracked and Poly Gasoline: 66.2° API Gravity; 9.9-Lb. R.V.P.; 355°F., E.P.

	Undesulfurized	Desulfurized
ASTM Octane No.	58.6	63.9
+ 1 cc. TEL/Gal	66.4	73.9
+ 3 cc. TEL/Gal	73.1	79.0
Research Octane No.	61.4	67.2
+ 1 cc. TEL/Gal	70.0	76.6
+ 3 cc. TEL/Gal	77.9	83.7
Total Sulfur, %	0.088	0.024

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Return Bends

TENTATIVE SCHEDULE OF TOPICS

The general topic of Heat Balances and Heat Duties has been discussed in the following installments of the Refiner's Notebook:

No. 40—May 5, 1945—Specific Heat Liquids
No. 42—May 19, 1945—Specific Heat Vapor
No. 43—May 26, 1945—Latent Heat
No. 45—June 9, 1945—Tower Balances
No. 48—June 30, 1945—Tower Temperatures
No. 71—Dec. 8, 1945—Exchanger Economy
No. 78—Jan. 26, 1946—Exchanger Duty
No. 102—July 20, 1946—An Exchanger Design
No. 105—Aug. 10, 1946—Heat of Combustion
No. 106—Aug. 17, 1946—Pipe Still Duty
No. 107—Aug. 24, 1946—Combustion Charts
No. 113—Oct. 5, 1946—Heat Balances of Stills

RETURN bends of two general types are available. Box, plug, or solid-body bends are most widely employed because they have a small center-to-center spacing and thus allow the tubes to be closely spaced. (See Table 1 and Fig. 1.) A close tube spacing is valuable in both the radiant and convection section of a pipe still. Closely spaced radiant tubes effectively absorb radiation, protect the furnace wall from radiant heat and of course less wall space is required. In the convection section a close tube spacing allows more tubes, a higher gas velocity and a higher rate of heat transfer.

Completely streamlined bends cannot be as closely spaced as the box type (see Table 1 and Fig. 1) but they produce less friction loss. In general such bends consist of a body which acts as a frame by which a smoothly curved 180° bend is held against the end of the tube or against a metal seat on the frame. The advantages in friction loss through such a bend are indicated in Table 2 which is based on "equivalent diameters" of straight tubing of 80 and 40 for box and streamlined bends.

Forged or cast carbon steel is the common material for return bends. Refiner's Notebook 115 (October 19, 1946) on Tube Strength will indicate alloy materials that are employed for high-temperature high-pressure bends. Bends are expensive and hence alloy elements for retarding corrosion are extensively used.

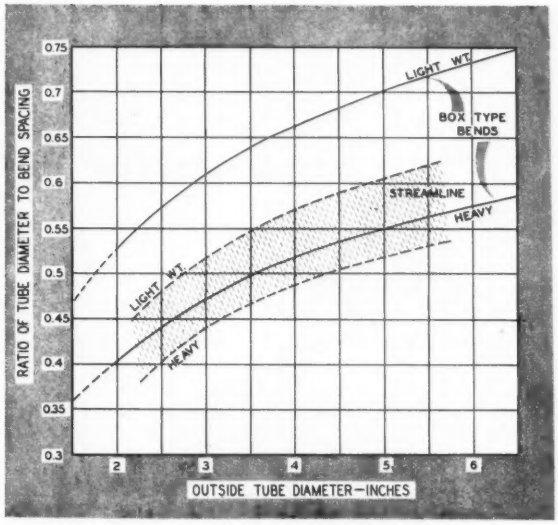

Fig. 1—Approximate ratio of tube diameter to center-to-center spacing of return bends

TABLE 1—APPROXIMATE MINIMUM SPACING OF TUBES

Tube size o.d. (in.)	Minimum center-to-center spacing of tubes, in.						
	Solid body or box type bends					Completely streamlined bends	
	Series 500°	Series 800°	Series 1,250°	Series 1,600°	Series 2,000°	Light	Heavy
2	3¾	4	4¼	4½	4⅞	4½	5⅞
2½	4⅜	4½	4⅞	5⅛	5⅝	5	6¼
3	5	5⅛	5½	5⅞	6⅜	5¾	6¾
3½	5½	5¾	6⅛	6½	7	6⅜	7½
4	6	6¼	6¾	7⅛	7¾	6¾	8¼
4½	6⅝	6⅞	7⅜	7⅞	8½	7½	8¾
5	7⅛	7⅜	8	8½	9¼	8¼	9¾
5½	7⅝	8	8⅝	9⅛	9½	8¾	10¾
6	8¼	8⅝	9¼	9¾	10½		

*The series number is the pressure in pounds per square inch that can be maintained at 825° F. At higher temperatures the allowable pressure is lower unless alloy steels are employed. Thus, 0.5 per cent molybdenum allows a temperature of 900° F. and 6 per cent chromium 0.5 per cent molybdenum allows 950° F.

TABLE 2—APPROXIMATE EQUIVALENT LENGTHS OF BENDS

Tube size o.d. (in.)	Equivalent length, (ft.)		Tube size o.d. (in.)	Equivalent length, (ft.)	
	Box	Streamline		Box	Streamline
2	13.33	6.67	4½	30.0	15.0
2½	16.67	8.33	5	33.3	16.7
3	20.00	10.00	5½	36.7	18.3
3½	23.33	11.67	6	40.0	20.0
4	26.67	13.33	6½	43.3	21.7

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Problems Relating to Elementary Principles of the Pump

Problem 1.—If the altitude of X above sea level is such that the atmospheric pressure is 12.5 psi., what is the maximum theoretical height a perfect pump of the above kind would lift water at that locality?

Solution.—12.5/.434 = 28.8 ft.; i.e.

$$\frac{\text{psi.}}{\text{psi. per ft. of water column}} = \text{height of column in feet.}$$

Problem 2.—How much pressure would be exerted by a vertical column of water (a) 1,000 ft. high? (b) 3,200 ft. high?

Solution.—(a) 1,000 × .434 = 434 psi.; (b) 3,200 × .434 = 1,388.8 psi.

Problem 3.—A well is 5,000 ft. deep standing full of water. What is the pressure at the bottom of the hole?

Solution.—5,000 × .434 = 2,170 psi.

Problem 4.—How much pressure, pounds per square inch, is exerted by a column of water 1 in. high and 1 in. in area at the base—i.e., a cubic inch of water?

Solution.—

$$\frac{\text{Weight of a cubic foot of water}}{\text{Cubic inches per cubic foot}} = \text{weight per cu. in.}$$

62.4/1,728 = .0362 psi.

Alternative method:

$$\frac{\text{Weight of a column of water 1 ft. high and 1 in. in area}}{12} = \text{weight per cu. in.}$$

.434/12 = .0362 psi.

Problem 5.—How many ounces of pressure per square inch does the above represent?

Solution.—Pounds per square inch times ounces per pound = ounces per square inch.

.0362 × 16 = .579

Problem 6.—How high a column of water, expressed in inches, is required to give a pressure of 1 oz. per sq. in.?

Solution.—Expressed as proportions: 1 in. is to .579 oz. as x in. is to 1 oz. Therefore, 1/.579 = x/1. x = 1/.579 = 1.725 in. of water.

Problem 7.—If the atmospheric pressure is 14.4 psi. and the water in D of Fig. 1 stands 4 in. deep over the valve V_b, what is the static pressure on top of the valve, expressed as pounds per square inch?

Solution.—

$$\frac{\text{Height of water in inches times pressure of 1 in. of water expressed as ounces}}{16}$$

plus 14.4 = lb. pressure per sq. in. on valve.

Or $\frac{4 \times .579}{16} + 14.4 = 14.545$ psi.

Problem 8.—In the preceding problem, if valve V_b weighs 3 oz., is circular in form, and has a diameter of 1.5 in., what is the pressure in pounds per square inch, exerted by the valve, and the combined weight of the water and atmosphere above it?

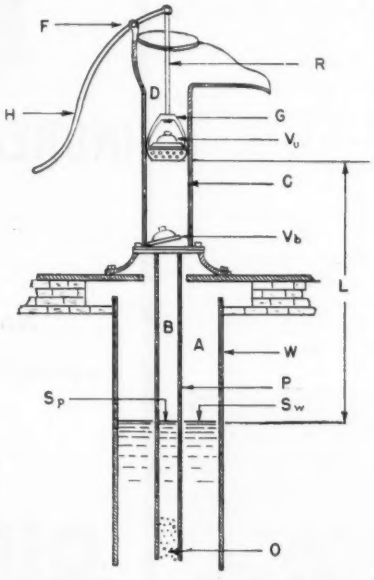


Fig. 1—Upward movement of plunger

Solution.—Weight in ounces divided by area in square inches = pressure per square inch.

$3/1/4\pi\ d^2$ = 1.768 oz. per sq. in.

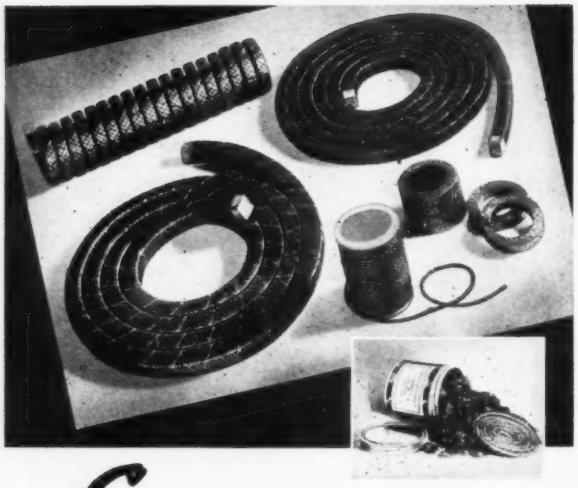
1.768/16 = psi. = .1105.

.1105 plus 14.545 = 14.6555 psi.

Useful Conversions

Multiply	by	And obtain
Atmosphere	33.947	Ft. water 62° F.
Atmosphere	29.929	In. Hg 32° F.
Atmosphere	30.011	In. Hg 62° F.
Atmosphere	1.03329	Kg./sq. cm.
Atmosphere	760	Mm. Hg 32° F.
Atmosphere	2116.35	Lb./sq. ft.
Atmosphere	14.6969	Lb./sq. in.
Atmosphere	760	Mm. of Hg 0° C.
Barrel, oil	5.6146	Cu. ft.
Barrel, oil	9702.0288	Cu. in.
Barrel, oil	42	Gal.
Cm., mercury	.1934	Lb./sq. in.
Col. water (1" x 1")	.434	Lb./sq. in.
Cu.ft. water (39.1°F.)	7.480519	Gal., U.S.
Cu. ft. water (39.1°F.)	62.425	Lb., avoir.
Density (to reduce)	62.4	Lb./cu. ft.
Ft. water	.0295	Atmospheres
Ft. water	.8826	In. Hg
Ft. water	62.355	Lb./sq. ft. (for ea. ft. head)
G./sq. cm.	.0142234	Lb./sq. in.
G./sq. cm.	2.048	Lb./sq. ft.
G./sq. cm.	.00096778	Atmospheres (Std. 760 mm.)
G./sq. cm.	735.514	Mm. (Column Hg 13.596 Sp. G.)
G./sq. cm.	28.9572	In. (Column Hg 13.596 Sp. G.)
G./sq. cm.	32.8083	Ft. (Column water max. den. 4C)
Head, 1 ft. water	.43302	Lb./sq. in.
In., mercury	.03342	Atmospheres
In., mercury	1.133	Ft. water
In., mercury	70.73	Lb./sq. ft.
In., mercury	.4912	Lb./sq. in.
In., water	.002458	Atmosphere
In., water	.07355	In. of Hg
In., water	5.202	Lb./sq. ft.
In., water, 60° F.	.03613	Lb./sq. in.
Lb./gal., liquid U.S.	7.48052	Lb./cu. ft.
Lb./sq. in.	2.30947	Head, ft. water, ft. submergence
Lb./sq. in.	.06804	Atmospheres
Lb./sq. in.	2.0353	In., Hg 32° F.
Lb./sq. in.	2.0416	In., Hg 62° F.
Lb./sq. in.	51.697	Mm. Hg
Lb./sq. in.	.07031	Kg./sq. cm.
Lb./sq. in.	27.71	In. water 62° F.
Lb./sq. in.	144	Lb./sq. ft.
Lb./sq. ft.	.01602	Ft. water
Lb./sq. ft.	.006945	Lb./sq. in.
Lb./sq. ft.	4.882	Kg./sq. m.
Lb./sq. ft.	.0004725	Atmospheres (Std. 760 mm.)
Lb. water	.01602	Cu. ft.
Lb. water	27.72	Cu. in.
Lb. water	.083	Gal., U.S.

Series prepared by Dr. E. A. Stephenson, head of petroleum engineering school, University of Kansas



Easy to Apply

GARLOCK *Plastallic* packing is easy to apply. You just tamp the loose form into the stuffing box and draw up on the gland. Coil, spiral and ring forms are applied in the usual way. And when additional packing is needed, you merely back off the gland and add more *Plastallic*. In service it combines into one homogenous mass. A special feature of GARLOCK *Plastallic* coil packing is that it is out-of-square to fit either of two different packing spaces. Save time with *Plastallic!*

Garlock 924 Plastallic—for acids and strong chemical solutions.
Garlock 926 Plastallic—for water, steam or air up to 550° F.
Garlock 927 Plastallic—for gasoline, oils, ether, etc., up to 550° F.
Garlock 928 Plastallic—for steam and hot oils over 550° F.
Garlock 929 Plastallic—for water, steam and general service up to 550° F.
Garlock 930 Plastallic—for gasoline, oils, gases, etc., at high or low temperatures.
Garlock 931 Plastallic—for steam, water or air at high or low temperatures.

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Tulsa, Okla. Houston, Tex.
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Plastallic

Black Magic Oil Base Drilling Fluid

INCREASES PRODUCTION

•

Not affected by salt, cement or high temperature

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Oil Base, Inc.
P.O. Box 3735 Terminal Annex, Los Angeles, Calif.

NATURAL GAS

Virginia Gas Transmission Expansion Authorized

WASHINGTON. — The Federal Power Commission recently made public today an order authorizing Virginia Gas Transmission Corp., Charleston, W. Va., to enlarge its transmission facilities to augment Washington Gas Light Co.'s supply of natural gas.

The new facilities will enable Virginia Gas to increase its natural gas deliveries to Atlantic Seaboard Corp. which in turn will be able to supply more gas to Washington Gas Light Co. to meet expected demands of the customers of that company and its subsidiaries in the District of Columbia, Maryland and Virginia. Facilities authorized include construction of a 30-mile, 6-in. pipe line extending from a main pipe line near Lexington, Va., to Lynchburg, Va.

Panhandle Hearing Postponed

WASHINGTON. — The Federal Power Commission has ordered postponed until October 14 a hearing on the reasonableness and adequacy of terms of service in present rate schedules of Panhandle Eastern Pipe Line Co. The hearing had been set for September 16. The order directed Panhandle to show at the hearing that in taking on and serving natural gas to new direct industrial customers while refusing to serve additional natural gas to interstate wholesale customers for resale it does not discriminate against resale customers.

June Natural-Gas Sales Decline 4.9 Per Cent

NEW YORK.—Utility sales of natural gas, to ultimate consumers in June, declined 4.9 per cent compared with the same month in 1945, according to the American Gas Association. In June of this year sales were 1,697,292,000 therms compared with 1,784,646,000 therms in June 1945. The association's revised natural-gas sales index for June was 192.

For the 12 months ending June 30, sales of natural gas to ultimate consumers declined to 22,430,019,000 therms from 22,900,279,000 therms for the same period ending in 1945, or a decrease of 2.1 per cent. One therm equals about 100 cu. ft. of natural gas.

Expressed in 1,000 cu. ft., natural-gas sales also showed a decrease to 2,155,569,000 M.c.f. for the 12 months ending June 30, 1946, compared with 2,202,061,000 M.c.f. for the same period ending in 1945.

Mississippi Board Dismisses Gwinville Spacing Proposal

JACKSON, Miss.—The Mississippi Oil and Gas Board has issued an order dismissing the petition of major operators for 640-acre spacing for gas wells in Gwinville field, Jeff Davis County.

The board said it had not been given sufficient evidence to warrant the establishment of the regulation. In dismissing the petition, the board left in force a 320-acre spacing regulation. In another action, the board dismissed for lack of evidence a petition of operators for an allowable take of 75 bbl. of oil per well per day from the 115-well Heidelberg field, Jasper County.

Texas Legislature to Get Gas Conservation Proposals

AUSTIN.—At the next session of the Texas Legislature, proposals will be made to aid conservation of natural gas in Texas, it was disclosed last week. Bills will be drafted by a legislative committee of the governor's committee, which was appointed a year ago to study ways and means of conserving the state's oil and gas.

Proposals are for legal unitization of leases for pool operation and to require the Railroad Commission to give consideration to flare gas when allocating natural gas to pipe lines.

Natural Gasoline

Deerfield Granted Permit For Natural-Gasoline Plant

WICHITA, Kans.—Deerfield Petroleum Corp. has been granted permission by the Kansas Corporation Commission to build an absorption-type natural-gasoline plant, near the town of Deerfield, in Kearny County, Kansas. The new plant will connect with Kansas-Nebraska Natural Gas Co.'s natural-gasoline transmission line from the Hugoton field.

Capacity of the plant will be from 50,000,000 - 60,000,000 cu. ft. of gas daily. Cost is estimated to be some $66,000. It is expected to be completed and in operation about November 15, 1946.

The Corporation Commission directed that after extracting gasoline, the remaining gas would be returneed to the lines of Kansas-Nebraska Natural Gas Co. for transport to markets in north central Kansas and southern Nebraska.

Natural-Gasoline Output in July Shows Increase

Daily average production of natural gasoline, all grades, increased from 3,984,650 gal. in June to 4,044,891 gal. in July, a gain of 1.5 per cent, according to the monthly report on Mid-Continent and Gulf Coast plants by the Natural Gasoline Association of America. Texas accounted for the greatest share of the total increase with production up from 74,544,763 gal. in June, to 77,384,849 gal. in July.

July production of 26-70 grade, totaling 36,049,688 gal., against 32,868,755 gal. in June, was an increase of 6.1 per cent, on a daily average basis.

The Bureau of Mines' survey for June shows production of natural gasoline and allied products up 3 per cent. June daily average was 13,091,000 gal., compared with 12,708,000 gal. in May, and 12,993,000 gal. in June 1945. The greatest increase in June occurred in the Texas Panhandle. Stocks continued to increase and were 308,385,000 gal. on June 30, compared with 294,181,000 gal. on May 31, an increase of 4.8 per cent.

Ector County, Texas Plant Sold by Barnsdall Oil Co.

MIDLAND, Tex.—Barnsdall Oil Co. has sold its natural-gasoline plant in Foster field of Ector County, Texas, to the Odessa Natural Gasoline Co.

The Odessa company was recently organized with W. D. Noel and E. G. Rodman, both of Odessa, as president and vice president, respectively. The absorption-type unit, in operation since February 1938, has an average monthly production of 14,500 bbl. of natural gasoline and butane and a capacity of 14,000,000 cu. ft. of gas daily. It is equipped with special facilities for processing sour gas.

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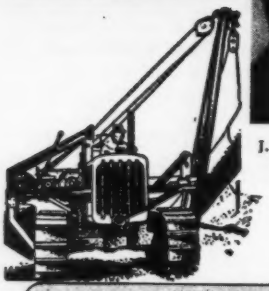
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PIPE LINES

Bayou System's Peacetime Operations Outlined

Several changes have been made in the Bayou Pipe Line System in the course of transition to a definitely assured peacetime basis of operation.

As of June 1, Texas Pipe Line Co. sold its undivided interest in the Bayou System partly to other participants and partly to Atlantic Pipe Line Co. Consequently, Atlantic is now an owner, instead of Texas, along with Crown Central Petroleum Corp., Humble Pipe Line Co., Pan American Pipe Line Co., Pure Transportation Co., and Shell Pipe Line Corp.

Bayou's throughput has been built up progressively from a temporary low in February, when the monthly daily average was 14,530 bbl., to 36,250 bbl. in July. Naturally, this does not compare with the maximum wartime throughput of 64,250 bbl. but it does represent more closely the basis of peacetime business for the system.

Atlantic Pipe Line Co. expects to lay a connecting line from its Atreco refinery to Bayou's Port Neches, Tex., terminal for deliveries which will commence in October.

As soon as American Oil Co., Crown Central Petroleum Corp., Pan American Refining Co., and Pure Oil Co. complete construction of additional bulk terminals along the Plantation Pipe Line Co. system, into which Bayou feeds, deliveries from these shippers will be increased.

Coincident with the change from wartime to peacetime operations and the rescinding of PAW Directive 59, the operation of the system was changed from "common stream" to branded batch deliveries. Batches range from 25,000 to 60,000 bbl.

As an operating economy four pump stations on the Port Neches to Baton Rouge 10-in. segment have been abandoned and dismantled. At the present time that segment retains a throughput capacity of 52,000 bbl. daily as compared to a wartime maximum of 68,300 bbl. Thus, the entire Bayou stream will continue operation with seven stations instead of the original eleven. There has been no change in stations of the Baytown-Port Neches segment which continues with a throughput of 43,000 bbl. daily.

The Bayou system operates with exceptionally low loss experience. During the first 7 months of 1946, losses averaged only 0.8 per cent. Contamination between products is exceptionally low. For example, there was a transfer to housebrand of only 194 bbl. out of a total of 607,000 bbl. delivered in July; and 549 bbl. of kerosene in a total of 55,000 bbl. delivered. The large cut in kerosene is necessary to protect the flash point.

Present tariffs for movement of products from Houston and Texas City refineries to Baton Rouge is 12 cents per barrel.

Shell Contracts for Reconditioning Projects

Shell Pipe Line Corp. is preparing for extensive reconditioning of crude-oil lines in the last half of 1946, totaling 242 miles. Some of the contracts have been awarded.

On the McCamey-Cushing line contracts have been let as follows: Wood Engineering & Construction Co., 41 miles; Holland Construction Co., 32

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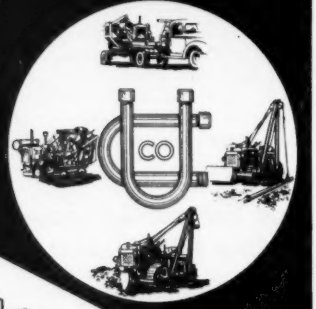
United
CONTRACTING CO.
28th and Layton Sts. - P. O. Box 7098
FORT WORTH 3, TEXAS

miles (Haskell to Wichita Falls); a third section of 15 miles remains to be let.

For the Kilgore-Houston 10-in. line, contracts went to Holland for 58 miles; Anderson Brothers, 32 miles of trunk lines and 21 miles of the Kilgore gathering system of various sizes. Announcements have not been received regarding letting of contracts for 41 miles on the Kansas-Cushing line and for 10 miles of 6-in. on the Wasson-Westbrook line.

The 242 miles of reconditioning for 1946, together with 252 miles of such work done in 1945, total 474 miles which is 12 per cent of the company's main-line mileage.

New California Line to Be 6, 8, 10, and 12-in. System

SAN FRANCISCO.—Pacific Public Service Co.'s new natural-gas line extending from Pittsburg, Calif., near San Francisco, to the Suisun Bay, Kirby Hill, and West Rio Vista gas fields in Solano County, will be a combination 6, 8, 10, and 12-in. system.

The new line will have capacity of approximately 65,000,000 cu. ft. per day and will cost about $900,000. It will be approximately 395 miles long and is to connect with the Stanpac line which extends south from the San Francisco Bay area to Kettleman Hills and connects with the East Rio Vista field.

Shell Oil Co., Inc., and Standard Oil Co. of California have nine productive gas wells in the Kirby Hills-Suisun Bay area, and a subsidiary producing company of Pacific Public Service Co. has one completed well on the west side of the Rio Vista field, none of which is currently connected with a pipe-line system.

The new line, scheduled for completion this year by Pacific Pipeline Construction Co., of Los Angeles, to which the construction contract has been awarded, will deliver chiefly to Contra Costa County consumers. Contra Costa is served by Coast Counties Gas & Electric Co., another subsidiary of Pacific Public Service Co.

Shell to Overhaul Texas, Oklahoma Pipe Lines

HOUSTON. — Announcement of a $1,000,000 pipe line reconditioning program in Texas and Oklahoma by Shell Pipe Line Corp., was made this week by T. E. Swigart, president.

The program will include overhauling 81 miles of the company's Houston-Kilgore 10-in. trunk line, 19 miles of gathering lines in the East Texas field, and 42 miles of West Texas 6 and 10-in. trunk lines. Location of the West Texas reconditioning will be between Denver City and Westbrook and between Haskell and Wichita Falls. An additional $700,000 will be spent on similar work in Oklahoma, comprising 67 miles of 10-in. line between Healdton and Cushing, and 38 miles of 6-in. line between Arkansas City and Tonkawa.

Contracts for the work have been placed with Anderson Brothers of Houston, and Holland Construction Co. of Tulsa. The project will be completed in approximately 100 days and will include the uncovering, cleaning, repairing, painting, coating, rewrapping, and recovering of the lines in the areas indicated.

Sinclair Starts Products Terminal at Bryan, Ohio

In connection with Sinclair Refining Co.'s postwar expansion of pipe lines and facilities, the company last week announced plans to construct a $100,000 terminal about 1 mile northeast of Bryan, Ohio, to receive fuel oil, gasoline, and kerosene from the 8-in. line extending across Williams County.

The project will include an office building and six 10,000-bbl. oil storage tanks. Weaver Construction Co., of Bryan, was to start work this week.

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An Appreciation

REED ROLLER BIT COMPANY

HOUSTON, TEXAS

August 15, 1946

S. P. FARISH
PRESIDENT

To Our Customers:

To our good customers who suffered many handicaps during the war in not being able to get Reed Roller Bit products when required, we express our deep appreciation of the very fine, considerate attitude shown and the spirit with which these inconveniences were accepted.

During the war, our manufacturing facilities were through necessity largely utilized in the production of materiels for war. We are proud of the production played in furnishing war requirements, which consisted of products that required in general similar manufacturing methods to regular Reed products. A list of the products manufactured for war by Reed is shown on the opposite page.

Now the Reed manufacturing facilities are back on full production of regular Reed products. These facilities have been greatly added to with new modern production machines, heat-treating furnaces, laboratory control equipment, etc. Reed is now receiving and using better qualities of alloy steels for producing Reed products than were used during the war. We are therefore now ready and anxious to serve our customers with Reed products of a quality higher than has ever before been offered, and solicit your business with assurance that your continued good will will be amply justified.

Yours very truly

REED ROLLER BIT COMPANY

S. P. Farish

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A List of War Requirements Manufactured by Reed Roller Bit Company During the War

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155 MM Shells

•

75 MM Gun Tubes

•

81 MM Mortar Projectiles

•

Anti-Submarine Shells

•

Engine Mounts for A-24 Dive Bombers

•

B-24 Landing Gear Shock Absorbers

•

A-20 Landing Gear Shock Absorbers

•

AT-10 Landing Gear Shock Absorbers

•

AT-11 Landing Gear Shock Absorbers

•

Other Miscellaneous Airplane Parts

Regular Reed Products

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REED TOOL JOINTS

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REFINING

Increase Reported in Oil-Refining Dividends

WASHINGTON. — Dividends paid by the oil-refining industry increased 7 per cent during the 3 months ended June 30, over the same period last year, according to a report by the Department of Commerce.

Total corporate dividends of all types of industry for the 3-month period ended June 30, 1946, were $970,000,000, an increase of 3.8 per cent from the same period a year ago when dividends totaled $934,600,000. The oil-refining industry paid $89,600,000 to stockholders during the 3-month period this year, against $83,700,000 in the same period last year.

Noninflammable Hydraulic Fluid Developed by Navy

WASHINGTON. — The Navy has developed a noninflammable hydraulic fluid which is expected to markedly improve the flying safety of both military and commercial aircraft, the Bureau of Aeronautics disclosed this week.

Hydraulic fluid under high pressure is piped to many parts of an airplane to actuate landing-gear retracting units, flaps, automatic controls, etc., and is also used in hydraulic brakes. The petroleum oil previously used has been a serious fire hazard to military aircraft and many fires in combat have been attributed to its use. The new fluid has a water base and contains additives giving it lubricating qualities, corrosion resistance, and a freezing point below —50° F., the bureau said.

Grease Institute Meeting To Open September 30

Practically the entire gamut of grease technology and practices will be treated in papers presented before the National Lubricating Grease Institute at its fourteenth annual meeting September 30-October 2 in the Edgewater Hotel, Chicago.

Outstanding in its promise of adding important data to the technology of grease manufacturing and handling is the symposium the morning of October 2 on pumping greases and the characteristics of dispensing equipment, a discussion to be given before the technical committee of the institute. The program follows:

SEPTEMBER 30

Morning session—"The War and Postwar Grease Industry in England," S. J. M. Auld, chief technologist, Socony-Vacuum Oil Co., Ltd., chairman grease subcommittee, Institute of Petroleum, London, England; and "Evaluation of High Temperature Greases," R. C. Adams and S. M. Collegeman, U. S. Naval Engineering Experiment Station. Afternoon session — "Pressure - Viscosity Characteristics of Greases," T. G. Roehner, Socony-Vacuum Oil Co., Inc.; "Design of Antifriction Bearing Installations," Walter Saveland, Allis-Chalmers Manufacturing Co.; "Electron-Microscope Studies of Lubricating Greases," B. B. Farrington, California Research Corp. "Rapid Method of Extraction from Greases," Glenn Williams, Battenfield Grease & Oil Corp.

OCTOBER 1

Morning session — "Improved Accessibility of Chassis Grease Fittings," Walter Duncan, Alemite Division, Stewart Warner Corp.; "Design of Antifriction Bearings to Prevent Overfilling and to Permit Periodic Flushing," H. R. Reynolds, chief engineer, Fafnir Bearing Corp.; "Continuous Process for Recess Aluminum Grease," H. G. Houlton, M. Sutton, and H. W. Bevarly, Votator Division, The Girdler Corp.; and "Aviation Grease Problems," Gill Brower, Pan-American Airways. Afternoon session— "Advantages of the Proper Care of Motor Car Lubricants," Dayton P. Clark, Gulf Oil Corp.; "Lubrication Problems of the Future," H. R. Wolf, General Motors research laboratories division; and "Strontium Greases," L. W. McLennan, research department, Union Oil Co. of California.

OCTOBER 2

Morning session — Technical Committee: Symposium on "Pumpability of Greases and Delivery Characteristics of Dispersing Equipment," prepared discussion by leading grease technologists and dispensing equipment engineers. Afternoon session— Technical Committee: Open business meeting.

Gulf Coast Runs Drop to 72 Per Cent of Capacity

HOUSTON.—Operations of member companies of the Gulf Coast Refiners Association showed a marked drop during the first half of August when crude runs to stills fell from 94 to 72 per cent of operating capacity.

The association's semimonthly report said runs totaled 114,046 bbl. daily against 149,970 bbl. daily the last half of July. Rated operating capacity is 158,000 bbl. daily.

Stocks of all grades of gasoline and naphthas dropped 221,207 bbl. the first half of August and were reported at 1,893,762 bbl. Aviation gasoline stocks fell 43,939 bbl. to 252,602 August 15. Total stocks of all products in the plants of the group were

reported at 4,143,143 bbl. August 15, a drop of 184,593 bbl. A year ago, total products stocks were 2,702,872 bbl.

Grease Institute Issues New Technical Bulletin

The National Lubricating Grease Institute has issued a new technical bulletin entitled "Determination of the Flow Characteristics of Lubricating Greases."

The bulletin covers the development of a pressure-viscosimeter suited for determining the apparent viscosities of lubricating greases over a considerable range of rates of shear. The viscosimeter instrument and its method of operation are described, and additional chapters in the bulletin deal with the significance and application of grease viscosity data.

Copies of the bulletin may be procured from C. E. Bolte, secretary, National Lubricating Grease Institute, 1116 Land Bank Building, Kansas City, Mo., at $1 each.

Technical Reports Available On Refining Processes

WASHINGTON.—The Office of Technical Services announced new reports of interest to the refining industry. One deals with a new technique for adding ethylene polymers to petroleum-oil distillates in the refining process, eliminating the need for solvent extraction. This report describes the manufacture and application of lubricants in Germany.

The second, involving 11 separate reports, deals with the development of improved hydraulic, recoil, and special oils for the Army and Navy during the war. Orders should be addressed to the Office of Technical Services, Department of Commerce, Washington 25.

New Oil-Base Spray Tested

NEW YORK.—A new oil-base spray, developed by the Shell Oil Co., Inc., to combat Japanese beetles and other pests, proved effective when tested August 3 on a 10-acre beetle-infested corn field in Raspeburg, near Baltimore, Md., according to Shell entomologists. The new spray contains DDT in a special base and is noninjurious to plant life, according to Shell's announcement.

Tar-Sand Transfer Due

OTTAWA, Ont.—J. A. Glen, Canadian minister of resources, has informed the House of Commons that the federal Government is negotiating for the retransfer to Abasand Oils, Ltd., of properties and rights in the tar-sand area of northern Alberta taken over as a wartime measure.

Glen said the Government would continue drilling to determine the extent of the deposits but that no other government operations would be undertaken.

New Owners Acquire Refiners Petroleum Co.

CHICAGO. — Announcement was made this week of the acquisition of the Refiners Petroleum Co. by Fred A. Schaefer and Carl H. Saas, who previously operated a Chicago office jointly with Great Lakes Oil Co. The new firm will market petroleum products by tank car and truck in the middle western states.

Heavy Oil Quota Increased

LLOYDMINSTER, Alta.—Canadian National Railways has increased its fuel-oil quota from heavy crude fields of eastern Alberta from 10,000 to 34,000 bbl. a month. The action follows substantial recent increases in the production of heavy crude from Lloydminster field.

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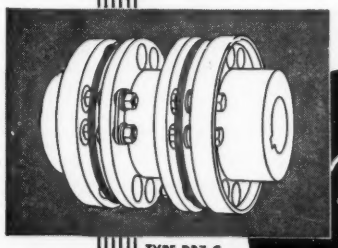

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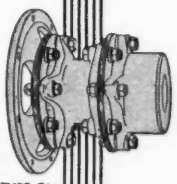
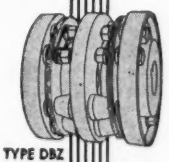


TYPE CM



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Toronto

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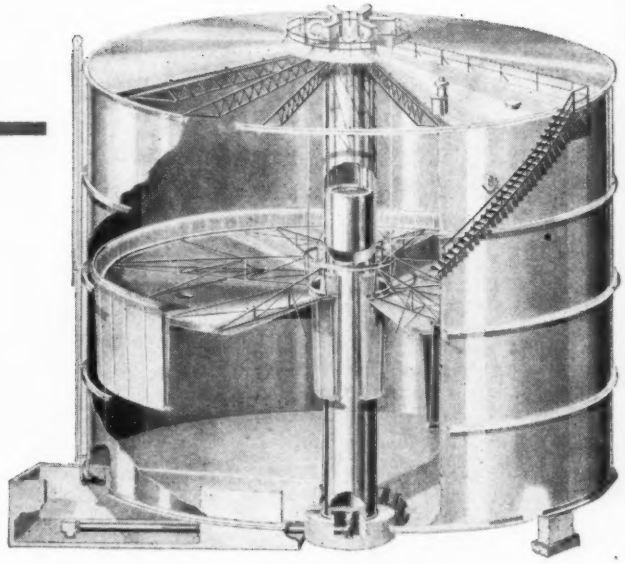
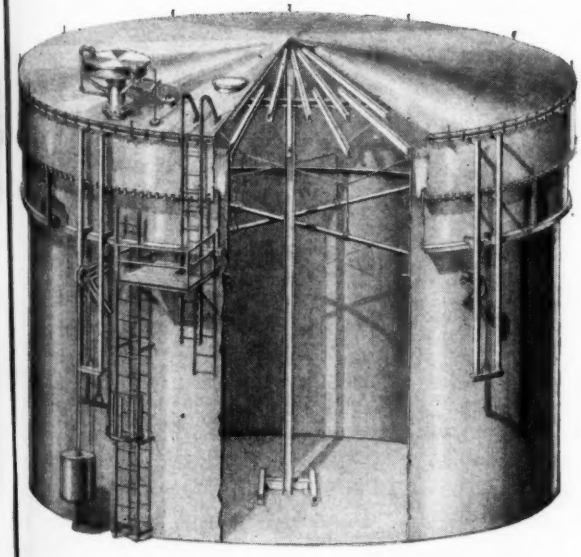
- Ten Years Field Performance Endorse The Design
- Can Be Attached To Group Of Existing Tanks Without Shutting Down Their Operation (patented)





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STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 31, 1946

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	32	16	0	*16	43,567	1,048	953	0	0	0	0	0	0	0	0	0	0
Pennsylvania	76	41	8	†27	117,002	2,639	2,732	0	0	0	0	0	0	0	0	0	0
West Virginia	20	3	14	3	44,899	476	533	0	0	0	0	0	0	0	0	0	0
Ohio	22	8	8	6	51,869	796	601	0	0	0	0	0	2	0	11	25	38
Indiana	10	7	0	3	17,578	240	132	0	0	0	0	0	2	0	0	12	14
Kentucky	4	1	1	2	9,597	322	340	0	0	0	1	1	3	0	0	30	33
Illinois	51	33	0	18	129,848	1,468	1,155	3	0	0	9	12	30	0	1	274	305
Michigan	21	8	2	11	50,349	536	481	0	0	0	6	6	17	0	5	174	196
Kansas	42	22	7	13	129,432	1,315	1,126	1	0	0	4	5	21	0	1	171	193
Neb., Mo., Iowa	0	0	0	0	0	15	17	0	0	0	0	0	0	0	0	11	11
Oklahoma	66	40	9	‡17	235,139	1,754	1,595	3	0	1	9	13	59	0	29	215	303
Texas	167	95	8	64	694,377	5,305	4,791	4	0	0	43	47	132	21	21	869	1,043
North Central	57	27	0	‡30	149,392	1,897	1,455	1	0	0	17	18	37	0	2	359	398
West	37	30	0	7	169,757	1,136	1,206	1	0	0	7	8	34	0	1	120	155
Panhandle	5	1	4	0	15,080	217	377	0	0	0	0	0	0	0	0	5	5
Eastern	16	10	1	5	65,882	494	219	0	0	0	4	4	11	0	2	62	75
Gulf Coast	41	24	3	14	259,039	1,163	1,086	2	0	0	9	11	32	19	8	173	232
Southwest	11	3	0	8	35,227	398	448	0	0	0	6	6	18	2	8	150	178
Louisiana	37	17	4	16	212,699	883	674	2	0	0	6	8	39	7	7	118	171
Northern	20	9	4	7	62,084	493	255	0	0	0	4	4	8	0	2	67	77
Southern	17	8	0	9	150,615	390	419	2	0	0	2	4	31	7	5	51	94
Arkansas	4	2	0	2	22,948	118	119	0	0	0	1	1	5	0	0	26	31
Mississippi	5	2	0	3	28,619	160	240	0	0	0	3	3	1	0	1	45	47
Southeastern States	1	0	0	1	4,787	29	40	0	0	0	1	1	1	0	0	24	25
Montana	7	4	1	2	12,427	202	206	0	0	0	0	0	9	0	1	23	33
Wyoming	4	4	0	0	12,462	118	135	1	0	0	0	1	11	0	3	28	42
Colorado-Utah	3	3	0	0	19,261	94	25	0	0	0	0	0	4	0	0	11	15
New Mexico	5	5	0	0	27,217	246	284	0	0	0	0	0	3	0	0	25	28
California	27	20	1	6	140,967	1,132	1,572	6	0	0	5	11	14	0	3	149	166
Total United States	604	331	63	210	2,005,044	18,896	17,751	20	0	1	88	109	353	28	83	2,230	2,694
Total previous week	577	302	72	203	1,881,028	18,292	17,275	12	1	3	82	98	333	28	82	2,142	2,585
Total Sept. 1, 1945	476	258	56	162	1,541,215			7	0	5	49	61	343	17	97	2,263	2,720

Service wells included: *16, †27, ‡1.

MARKET QUOTATIONS

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$1.17	....	....	....
19-19.9	1.21	....	$1.41	....
20-20.9	1.24	$1.20	1.43	1.07
21-21.9	1.28	1.22	1.45	1.09
22-22.9	1.32	1.24	1.47	1.11
23-23.9	1.35	1.26	1.49	1.13
24-24.9	1.39	1.28	1.51	1.15
25-25.9	1.43	1.30	1.53	1.17
26-26.9	1.46	1.32	1.55	1.19
27-27.9	1.50	1.34	1.57	1.21
28-28.9	1.54	1.36	1.59	1.23
29-29.9	1.57	1.38	1.61	1.25
30-30.9	1.61	1.40	1.63	1.27
31-31.9	....	1.42	1.65	1.29
32-32.9	....	1.44	1.67	1.31
33-33.9	....	1.46	1.69	1.33
34-34.9	....	1.48	1.71	1.35
35-35.9	....	1.50	1.73	1.37
36-36.9	....	1.52	1.75	1.39
37-37.9	....	1.54	1.77	1.41
38-38.9	....	1.56	1.79	1.43
39-39.9	....	1.58	1.81	1.45
40 and above	....	1.60	1.83	1.47

*Includes Lea County, New Mexico.

(Quotations shown here are f.o.b. plant in tank cars and in cents per gal. as of last Monday. Crude prices reflect latest 25-cent advance except in California and Pennsylvania where no increase had been made as of Monday morning, July 29.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-78½†	73-75
Mid-Continent*	7.500-7.750	6.875-7.000
Tex. Gulf Coast	7.250	6.500-6.750
New York Harbor	8.750-9.500	7.750-8.500
California		7.000-7.875

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades—	26-70	18-55
Oklahoma (Group 3)	4.500	5.400
N. Texas (f.o.b. plant)	4.000	4.800
N. Louisiana (f.o.b. plant)	4.250	5.100
California (averages)	5.500	6.250

CRUDE-OIL PRICES

Representative posted schedules per bbl

East Texas	$1.60
Kettleman Hills, California*	1.69
Beauregard Parish	1.55
Illinois Basin	1.72
Pecos County, Texas	1.30
Bradford, Pennsylvania	3.41
Eastern Ill., and Western Ind.	1.57

Note: Exclusive of subsidy.
*For 37-37.9 gravity.

A.P.I. REFINERY REPORT

Week ended August 24, 1946
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks—Gasoline	Stocks—Distillate	Stocks—Residual
East Coast	782	21,798	17,329	9,907
Appalachian	162	3,253	627	430
Ill., Ind., Ky.	825	15,722	7,439	4,936
Okla., Kan., Mo.	378	8,060	3,276	1,398
Inland Texas	216	2,520	540	785
Tex. Gulf Cst.	1,196	12,595	7,908	5,523
La. Gulf Cst.	352	4,537	2,729	1,673
N. La., Ark.	54	1,679	445	170
Rocky Mtn.	131	1,432	551	767
California	770	14,655	10,561	26,472
Total 8-24-46	4,866	86,251	51,405	52,061
Total 8-17-46	4,907	87,036	48,917	51,827
Total 8-25-45	4,887	84,587	40,037	46,510

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended—	Bbl. of crude*
August 24, 1946	225,672,000
August 17, 1946	225,583,000
August 25, 1945	211,813,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 31 crude oil	B. of M. Aug. demand	Aug. 24 crude oil
Alabama	1,150	2,000	1,050
Arkansas	78,600	78,000	79,950
California	875,400	850,000	872,500
Colorado	32,700	30,000	36,140
Eastern	65,500	64,000	67,500
Florida	150	200	150
Illinois	209,300	215,000	203,800
Indiana	19,400	19,000	18,600
Kansas	279,550	260,000	274,900
Kentucky	30,650	31,000	30,750
Louisiana	397,150	380,000	395,850
North Louisiana	93,350	.....	92,050
South Louisiana	303,800	.....	303,800
Michigan	46,677	47,000	46,509
Mississippi	72,300	60,000	76,600
Montana	25,300	24,000	26,750
Nebraska	700	800	700
New Mexico	100,850	99,000	100,850
Oklahoma	385,500	384,000	384,600
Texas	2,119,800	2,120,000	2,119,800
District 1 (Southwest)	19,500	.....	19,500
District 2 (Southwest)	155,100	.....	155,100
District 4 (Southwest)	224,300	.....	224,300
District 3 (Gulf Coast)	486,550	.....	486,550
District 5 (Eastern)	43,050	.....	43,050
District 6 (Eastern)	105,650	.....	105,650
East Texas Field	317,000	.....	317,000
District 7C (West)	27,900	.....	27,900
District 8 (West)	490,600	.....	490,600
District 7B (W. Central)	32,650	.....	32,650
District 9 (N. Central)	132,700	.....	132,700
District 10 (Panhandle)	84,800	.....	84,800
Wyoming	112,100	110,000	110,910
Total United States	*4,852,777	4,774,000	4,847,909
Change from prev. wk., up	4,868		

Total production January 1-August 31 ..... †1,150,949,727 bbl.
Same period last year (crude, plus condensate) 1,172,985,625 bbl.
*Not incl. 21,200 bbl. condensate. †Incl. 5,952,400 bbl. condensate.

CRUDE-OIL STOCKS 225,672,000 bbl. as of August 24—up 89,000 bbl. One year ago 211,813,000 bbl.

GASOLINE STOCKS 86,251,000 bbl. as of August 24—down 785,000 bbl. One year ago 84,587,000 bbl.

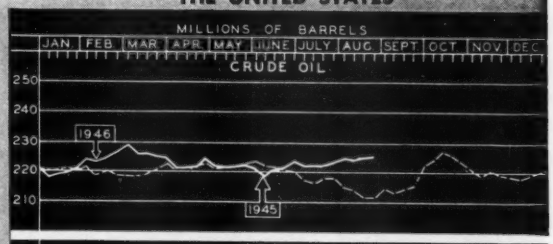
RESIDUAL FUEL-OIL STOCKS 52,061,000 bbl. as of August 24—up 234,000 bbl. One year ago 46,510,000 bbl.

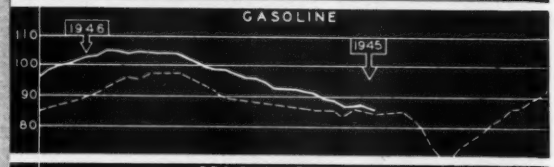
GAS OIL AND DISTILLATE STOCKS 51,405,000 bbl. as of August 24—up 2,488,000 bbl. One year ago 40,037,000 bbl.

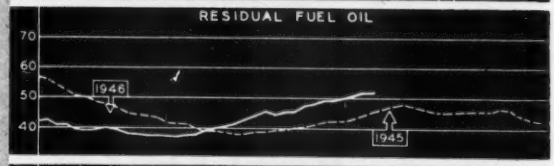
CRUDE-OIL PRODUCTION 4,852,777 bbl. as of August 31—up 4,868 bbl. One year ago 4,872,050 bbl.

REFINERY RUNS 4,866,000 bbl. daily week ended August 24—down 41,000 bbl. One year ago 4,887,000 bbl.

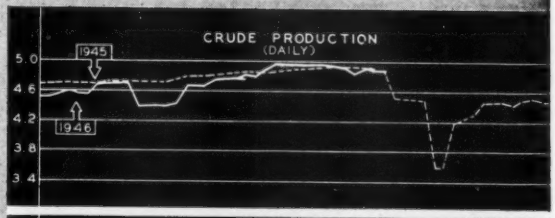
OIL STOCKS IN THE UNITED STATES

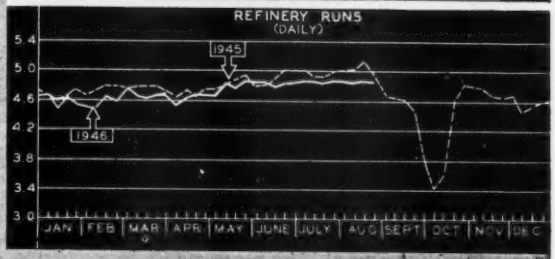




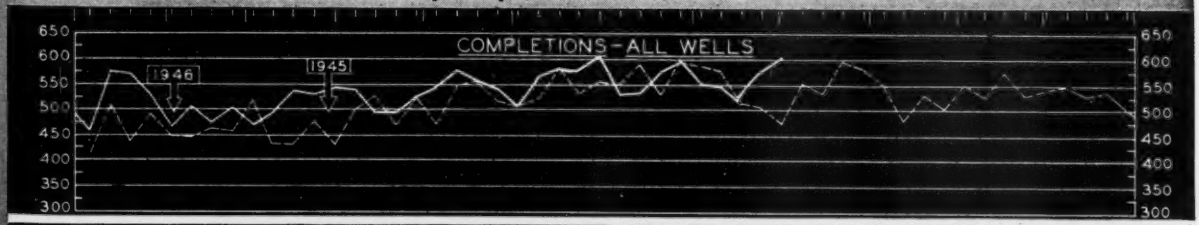


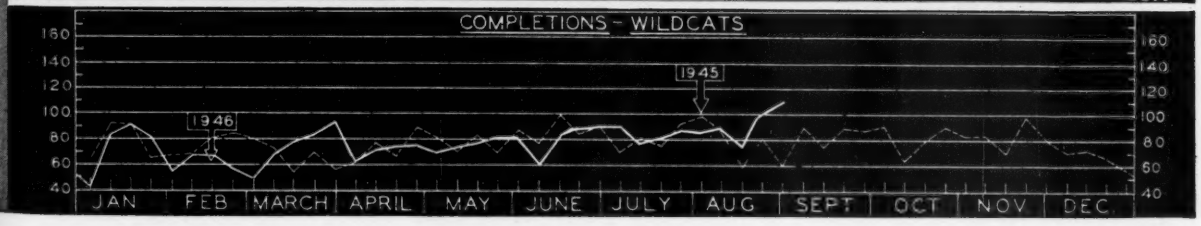
DAILY OPERATIONS





Solid line charts weekly completions, service wells in Eastern area included





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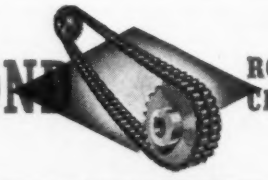

DIAMOND ROLLER CHAINS

Exploration and Drilling

California Discovery Confirmed

CALIFORNIA, which has lagged considerably behind in discoveries for the past few years, was assured an important new field last week with the successful completion of the British-American Oil Producing Co. and Texas Co. 1 Bodger, 22-3s-14w, in the Gardenia area of the Los Angeles Basin. After a week of experimenting by flowing the well through various size chokes, operators completed the well for an initial flowing gage of 1,040 bbl. of 26° gravity oil through a 22/64-in. choke. The well is reported to be making approximately 0.2 per cent water and is considered a very satisfactory completion. Gas volume is estimated at 800,000 cu. ft. per day.

Production is confirmed to be coming from the conglomerate at a total depth of 9,154 ft. Operators set 8⅝-in. casing at 9,087 ft. and then landed 88 ft. of 5½-in. pipe, including 70 ft. of perforated liner at 9,153 ft. The 2½-in. tubing is set at 9,066 ft.

The new discovery is situated on a 1,000-acre lease concentration involving city lots and is to be offset by discovery operators who are moving one location to the west for their second attempt.

Successful completion of the 1 Bodger climaxes several years of disappointing work done in an attempt to find production in the Gardenia area. Ohio Oil Co. drilled the first test in the area, the 1 Fish, 35-3s-14w, in 1930, and carried the well to a total depth of 7,418 ft. without success. Late in 1944, the same operators drilled the 6-1 Gardenia Community in 24-3s-14w, and were thought at that time to have made a discovery when the well came in for 500 to 1,000 bbl. of oil per day. The well flowed erratically by heads for a short time and began making a very high percentage of water. After several weeks work the company finally abandoned the well due to inability to effectively shut off the water, which was probably formation water, and restore the initial yield of oil.

The 6-1 Gardenia Community had virtually proved the existence of favorable reservoir conditions, however, leaving only satisfactory structural position to be determined. Ohio, consequently moved about 1 mile to the northwest and drilled the 4-1 Gardenia Community in 23-3s-14w. This third attempt was taken to a total depth of 10,290 ft. in the basement schist. Considerable trouble was experienced in testing this well as operators could not get packers to hold long enough for a conclusive test. It also was finally abandoned after several swabbing attempts produced only salt water.

Due to the three previous failures, the 1 Bodger is not too highly regarded despite its high rate of production. It may take several good producers before the majority of operators are convinced that an important strike has been made.

EASTERN TEXAS

Navarro County Gets First Deep Production

DALLAS.—Temple Hargrove 1 Guy Wallace, John Jones Survey, opened the first deep production for Navarro County 3 miles south of Richland. The well is estimated to be flowing 6 to 8 bbl. of fluid per hour, 10 to 15 per cent oil and the balance salt water, from the Rodessa. Oil is 25° gravity. Production is through perforations from 5,447-5,455 ft. The discovery was drilled to 6,185 ft. in the Travis Peak, with the casing cemented at 5,490 ft.

Humble Oil & Refining Co. 1 LeGory, Francis Hill Survey, 3 miles east of Crockett, Houston County, is dry at 7,539 ft. in the Woodbine. The last drill-stem test taken from 7,521-36 ft. recovered water with no shows of oil or gas. Magnolia Petroleum Co. has started 1-A Southern Pine, Leonard Williams Survey, a scheduled Edwards lime test 2 miles southeast of Weches in Houston County.

Delta Drilling Co. 1 Houston, A. L. Martin Survey, Van Zandt County wildcat ¾ of a mile northeast of Martin's Mill, ran a 15-minute drill-stem test of the Rodessa from 8,305-22 ft. and recovered 5 ft. of slightly gas-cut mud. Two cores from 8,298-8,322 ft. recovered lime with slight gas show. Humble 1 Hale, J. S. Ables Survey, wildcat at Kemp, Kaufman County, cut gray lime with no shows in cores from 5,816-82 ft. and 5,930-42 ft. It was drilling below 6,184 ft. in lime and shale.

East Texas field, Gregg County, had four completions this week, and Smithland field, Marion County, had three. Smithland field had three locations and Opelika field, Henderson County, Bethany field, Panola County, and Manziel field, Wood County, each had one. Carthage field, Panola County, has 29 drilling wells; Hawkins field, Wood County, 10; Opelika field, 5, and Talco field, Franklin and Titus counties, Waskom field, Harrison County, Pickton field, Hopkins County, and Sand Flat field, Smith County, have 4 each.

EASTERN TEXAS WILDCAT FAILURES

Bowie County: Delta Drlg. Co. 1 J. N. Gauntt, James Giles Sur., 10 mi. E Dalby Springs, elev. 324 ft., Comanchean 3,340 ft., dry, TD 3,716 ft.

Cherokee County: Tex-Harvey Oil Co. 1 Helen and Robt. Reitsch, O. Weir Sur., 10 mi. NE Rusk, elev. 321 ft., Austin chalk 4,133 ft., Woodbine 4,341 ft., dry, TD 4,423 ft.

Gregg County: B. F. Phillips 1 C. C. Crews, Leonard Perkins Sur., 2½ mi. W production in East Texas field, elev. 359 ft., Woodbine 3,718 ft., Georgetown 3,955 ft., dry, TD 4,026 ft.

Upshur County: Bobby Manziel et al 1 Judy Brown, South Henry W. Augustine Sur., 1½ mi. W Gladewater, elev. 300 ft., Buda 4,040 ft., dry in Georgetown, TD 4,175 ft.

SOUTHWEST TEXAS

Condensate Field Opened In Live Oak County

CORPUS CHRISTI.—The opening of a new gas-condensate producing area is indicated at Continental Oil Co. 2 Mrs. Clay West Burns, wildcat approximately 9 miles southwest of George West, in Live Oak County. On a 15-minute drill-stem test through perforations at 10,121-32 ft., the well developed 1,750 lb. surface pressure through ¼-in. chokes top and bottom, using a 5,000-ft. water cushion, and recovered 390 ft. of muddy water and 60 ft. of amber-colored condensate, with 3,900 lb. bottom-hole pressure flowing and 6,900 lb. bottom-hole pressure shut in. Operators now are running production packer for completion. This well is in the Wesley Sellman Survey. Continental has made a new location 1,867 ft. north of this well.

A new oil sand was opened at North Minnie Bock field in Nueces County by Louis Crouch 2 Walter L. Parr. Drilled to a total depth of 6,803 ft., this well is producing from a shallow sand topped at 5,990 ft. On potential test the well flowed 107 bbl. of oil per day through 7/64-in. choke, gas-oil ratio 1,965 to 1, with tubing pressure of 1,500 lb., and casing pressure 2,100 lb. Gravity is 36° with 6½ per cent water. Production is through perforations at 5,994-6,004 ft.

Sun Oil Co. 3 B. G. de Garcia, a deep outpost wildcat about 3,500 ft. southwest of Yturria field, in southeastern Starr County, gaged an estimated 8 bbl. of condensate per day through a 3/8-in. choke, tubing pressure 550 lb., casing pressure 600 lb., with gas-oil ratio 86,000 to 1. Total depth is 6,380 ft. with 5½-in. casing on bottom. Production is through perforations at 6,318-33 ft. This well is in Porcion 98, 3,022 ft. southwest of the 2 de Garcia dry hole.

United North and South Development Co. 1 J. F. Webb, wildcat in Guadalupe County southeast of Luling, has been abandoned. It was first reported as an oil well opening a new field. It pumped 175 bbl. of fluid, 50 per cent oil, a day, perforated at 2,421-53 ft. and 2,485-2,505 ft. in serpentine and chalk. It exhausted the supply of oil in a few weeks of pumping and has been abandoned as has also the No. 2, drilled nearby.

Only 8 of the 29 new locations reported

this week are wildcats. Three are in Duval, and 1 each in Edwards, Gonzales, Karnes, Live Oak, and Nueces counties. The 35 completions included 12 wildcats, one a new oil pay discovery in the North Minnie Bock field, Nueces County. The remaining 11 wildcats are dry, 2 in Webb and Brooks counties, and 1 each in Atascosa, Guadalupe, Karnes, Live Oak, San Patricio, Williamson, and Zapata counties. Brooks County received seven completions.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Nueces County: New oil pay, North Minnie Bock field—Louis Crouch 2 Walter L. Parr, in Geo. H. Paul's subd. of Driscoll Ranch, Lopez de Herrera grant, top pay 5,990 ft., TD 6,803 ft., perf. 5,994-6,004 ft., PT 107 bbl. oil per day through 7/64-in. choke, gas-oil ratio 1,965 to 1, TP 1,500 lb., CP 2,100 lb., gravity 36°, 6½ per cent water.

SOUTHWEST TEXAS WILDCAT FAILURES

Atascosa County: Southern Minerals Corp. 1 John Lytle Tom et al, W. E. Tom & Bros. Survey 2, 4 mi. SE of Campbellton, dry, TD 6,505 ft.

Brooks County: Sullivan & Garnett 1 T. S. Proctor, Los Olmos y Loma Blanca grant, 2½ mi. SE of Falfurrias, dry, TD 8,011 ft.

Humble 1-E Dallas Jt. Stk. Ld. Bank, BS&F Sur. 195, 13 mi. SW of Freer, dry, TD 3,050 ft.

Guadalupe County: United North & South Dev. Co. 2 J. F. Webb, James Hodges Survey, 4½ mi. SW of Luling, dry, TD 2,612 ft.

Karnes County: Jay Simmons 1 Edmund Olinick, Antonio Hernandez grant, 6 mi. E of Falls City, dry, TD 6,250 ft.

Live Oak County: Humphries & Hotchkin 1 George Rowold, Bridget Haughey Survey, 2½ mi. NE of Three Rivers, dry, TD 1,574 ft.

San Patricio County: Jones & Morgan 1 W. E. Runge, in John Pollan Survey, in West Sinton area, dry, TD 7,025 ft.

Webb County: O. W. Killam 2 Servando Benavides, AB&M Survey 685, 5½ mi. NE of Oilton, dry, TD 3,072 ft.

Westbrook Oil Corp. 3 Mabel Adami, H&GN RR Survey 335, 18 mi. W of Freer, dry, TD 1,293 ft.

Williamson County: C. L. Brown, Jr. 1 John Holub, J. Bevil Survey, 2 mi. SW of Thrall, dry, TD 1,108 ft.

Zapata County: Progress Pet. Inc. 1 Avelino and Romana T. Guerra, B. Gutierrez Survey, Share 5-A, Porcion 14, 20 mi. N of Roma, dry, TD 4,028 ft.

MICHIGAN

Casco Area Gets Four Producers

SAGINAW.—Four of six wells completed in the new Casco discovery area of Allegan County in the past week were small producers with a combined initial pumpage of 200 bbl. a day, plus some salt water in each. The other two completions, one classed as a wildcat test, were dry holes.

For the state there were 21 completions for 8 oil wells, 2 gas wells and 11 dry holes, while 20 new locations were announced. The other producers included three in Bay County, one in Arenac's Adams field. Six wildcat completions were dry and of the others one was a deep test with Sun Oil Co. abandoning its 2 Wilcox-Schoehals, Section 27, Osceola Township, Osceola County, at 5,292 ft.

Three of the Casco producers were in Section 20, the other in 29. The wildcat failure was in Section 21.

Lincoln Township, Clare County, where the two new gas wells are located, is the scene of eight of the new locations listed by Michigan Consolidated Gas Co. The others are: Four in Allegan County, three in Van Buren, one each in Saginaw, Huron, Mecosta, Kent, and Arenac.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: J. E. Hood 1 Fannie May Marr, NE SW NE 21-1n-16w, dry in Traverse limestone, TD 1,160 ft.

Arenac County, Standish Township: Frank Roush 1 Chester Schreiber, NE NW SW 18-18n-5e, dry in Dundee, TD 2,953 ft.

Mason County, Eden Township: Superior Oil Co. 1 A. M. and F. A. Barothy, SE NE SW 22-17n-16w, dry in Sylbania, TD 3,143 ft.

Mecosta County, Morton Township: C. L. Maguire, R. E. Fletcher 1 Carl Smith, NE NW NW 22-14n-8w, dry in Monroe, TD 3,691 ft.

Osceola County, Marion Township: Sun Oil Co. 1 A. C. Salisbury, C SW 10-20n-7w, dry, TD 1,478 ft.

Wexford County, Cedar Creek Township: R. A. T. Wright and M. Bliss Keeler 1 George Wilcox, NE NE SE 32-23n-9w, dry in Dundee, TD 4,008 ft.

APPALACHIAN FIELD

Important New Gas Field Indicated in West Virginia

PITTSBURGH.—A new important gas field may be indicated with the showing of 500,000 cu. ft. gas from the Onondaga chert in the test of Wm. E. Snee et al on Harrison Sisler farm on Briery anticline in Portland district, Preston County, West Virginia. The top of the Onondaga lime was at 5,560 ft., chert 5,575 ft., gas 5,622 ft., surface elevation 2,036 ft. This is the third test on that structure with the first dry through the Oriskany sand; the second was bottomed below the Oriskany sand and has a gage of 55,000 cu. ft. gas. The gas showing in the No. 2 correlates with that in the No. 3. The new test is about 50 ft. lower on structure than the No. 2 and drilling has been halted to run casing. Recently, the No. 2 was shut in for rock pressure and gaged 2,320 lb.

In Oceana district, Putnam County, the largest gas well of recent months, and in the new reserves being opened in the southern part of the state, was completed by the United Producing Co. as No. 1,387 Pardee Land Co. in the Maxton sand, topped at 2,094 ft. It had a final open flow of 19,673,000 cu. ft. gas with a rock pressure of 700 lb. in 24 hours, total depth 2,150 ft.

In Teays Valley district, Putnam County, Teavee Oil & Gas Co. completed the test Virginia Harbour Hrs. for 1,000,000 cu. ft. gas from the Injun sand, total depth 1,822 ft. This company's test on C. L. Young tract gaged 493,000 cu. ft. from the Salt sand, total depth 1,313 ft.

In Lee district, Calhoun County, McCal Drilling Co. completed a test on Garrett Hrs. in the Injun sand which is showing 28 bbl. oil a day with 200,000 cu. ft. gas, total depth 2,038 ft. A second location has been made.

New work totaled 14 locations which were in Braxton, Calhoun, Fayette, Jackson, Kanawha, Lincoln, Mingo, Pleasants, Ritchie, Wayne and Wyoming counties.

In Bell Township, Clearfield County, F. C. Deemer is drilling at 7,336 ft. in the Oriskany wildcat on Alice Irvin farm and, apparently, is in the bottom of the Marcellus as the formation is heavy with pyrites. The Onondaga lime is expected at every run. As there are no Oriskany wells within 100 miles north or south, it is a most important test. It is also unusual in that, to the present depth, a 10-in. hole has been carried using cable tools and it is, from the present records, the deepest 10-in. hole. Through the Hamilton and Marcellus there have been severe gas pockets which have raised the 10-in. tools up the hole but the size of the hole has prevented serious difficulties.

On Chestnut Ridge in Georges Township, Fayette County, Manufacturers Light & Heat Co. bottomed No. 7 Barton at 7,436 ft. in the Onondaga chert, with a final gage of 1,800,000 cu. ft. which was turned in the lines.

In North Strabane Township, Washington County, Keystone Gas Co. completed No. 3 George A. Markle for 25 bbl. a day from the Gantz and Gordon sands. The Gantz was logged at 2,228-2,317 ft., oil and gas 2,256-59 ft., Gordon 2,477-2,524 ft., oil 2,485-2,510 ft., total depth 2,526 ft.

New locations in southwest Pennsylvania totaled 13 and were located in Armstrong, Greene, Indiana, Jefferson, Washington, and Westmoreland counties.

TEXAS GULF COAST

New Oil Sand Discovered In Cedar Point Field

HOUSTON.—A new oil sand for Cedar Point Field in Chambers County has been opened by Standard Oil Co. of Texas and Salt Dome Oil Corp. at 33-M State-Galveston Bay, in the Galveston Bay, Section 118. Drilled to a depth of 3,880 ft., with top of sand 3,864 ft., this test flowed a potential of 121 bbl. per day of 27°-gravity oil through a 5/32-in. choke. Gas-oil ratio was 312 to 1, tubing pressure 190 lb., with no water in the flow. Production is through perforations at 3,867-76 ft.

A northwest extension to the Chocolate Bayou Pool of Brazoria County has been indicated in Pan American Production Co. 1 Callihan Unit, Angier-Hall-Bradley survey. Drilled to a depth of 12,204 ft., test was plugged back and perforated from 8,757-62 ft. and drillstem test, using ¼-in. chokes, with packer set at 8,688 ft., was run. A 3,000-ft. water cushion was used and, with tool open 34 minutes, there was a fair blow and then the well cleaned the water cushion and flowed oil at the rate of 12 to 15 bbl. per hour with 800 lb. flowing pressure on tubing. A flow test was made through a ½-in. choke and it gaged 8 bbl. per hour. Gravity was estimated at 40°, and gas-oil ratio at 2,500 to 1.

At Lane City Pool in Wharton County, the first submerged lease well for the field has been completed by George K. Taggart. The 1 State-Colorado River, on a 219-acre submerged lease in the Colorado River, flowed a potential of 85 bbl. of 24°-gravity oil in 24 hours through a 7/64-in. choke with 500 lb. tubing pressure and 1,000 lb. pressure on the casing. Gas-oil ratio was 400 to 1. Production is through perforations at 5,422-25 ft., regular field sand, with total depth at 5,475 ft.

Humble Oil & Refining Co. began operations this week at three wildcats in the Upper Gulf Coast area. In Grimes County, the 1 George Sealy Trustee, an 8,500-ft. test, in Ben F. Smith survey, 4½ miles southwest of Singleton, is drilling ahead after conductor pipe was cemented at 82 ft. In Newton County, Bon Wier area, W. H. Start survey, 3 miles southwest of Bon Wier townsite, their 1 E. P. Hughes et al, a 9,500-ft. test, is rigged up. In the Rayford area of Montgomery County, the 3 E. L. Bender, in the Montgomery County School Lands Survey 2, is rigged up. It will be a 6,500-ft. test.

There were 22 new locations reported this week, with 5 wildcats, 3 in Harris, and 1 each in Fort Bend and Wharton counties. The 17 completions included 1 new oil sand at Cedar Point field in Chambers County, and 4 dry wildcats, 2 in Chambers, and 1 each in Fort Bend and Montgomery coun-

ties. Matagorda and Chambers counties each received three completions with Fort Bend and Wharton receiving two each.

UPPER GULF COAST SUCCESSFUL WILDCAT

Chambers County: New Oil Sand, Cedar Point Field—Standard Oil Co. of Texas and Salt Dome Oil Corp. 33-M State-Galveston Bay, in Galveston Bay, Section 118, twin to 23-M-118, TD 3,880 ft., top sand 3,864 ft., perf. 3,867-76 ft., PT 121 bbl. per day through 5/32-in. choke, gas-oil ratio 312 to 1, TP 190 lb., gravity 27°, no water.

UPPER GULF COAST WILDCAT FAILURES

Chambers County: Frost & Blanke 1-B Janet MacCarthy, HT&B Sur. Sec. 93, in Fig Ridge area, dry, TD 8,763 ft.

Mac Drilling Co. 1 D. J. Cline, Jos. Whitcomb Survey, dry, TD 8,606 ft.

Fort Bend County: Humble 1 J. Brown Cutbirth, M. Shipman Survey, 6 mi. SW of Almeda, dry, TD 8,500 ft.

Montgomery County: Wm. S. Thompson 1 Sam L. Olson, in F.A.B. Wheeler survey, 1 mi. N of Dacus, dry, TD 3,550 ft. in Cockfield.

PERMIAN BASIN

Block 12 Pool Gets Second Producer

MIDLAND.—Superior Oil Co. of California 4-B-12 University, Section 16, Block 22, University Lands, west offset to The Texas Co. 1-P University, opener of the Block 12 pool in southwestern Andrews County, became the second producer in the pool. It flowed 615 bbl. of oil in 24 hours, after treating the bottom section from 7,141-235 ft. with 2,000, then with 6,000 gal. of acid. Gas-oil ratio was 57 to 1. The top section was to be acidized. On the northeast side of the area, Atlantic Refining Co. 1-C Texu, Section 10, Block 12, University Lands, ran a 1-hour drill-stem test from 8,830-8,950 ft. It started flowing oil in 42 minutes, then flowed pipe-line oil for 18 minutes at an estimated rate of 75 to 100 bbl. hourly. Total recovery was 8,900 ft. of oil. It was preparing to test for completion. To date, a total of 27 tests have been spotted in the new field.

Shell Oil Co., Inc. 1 Elizabeth Pinson, Section 13, Block A-40, Public School Land Survey, ¾ mile southwest outpost to the Nelson Ellenburger discovery in western Andrews, is dry in the Ellenburger at 10,845 ft. A 60-minute drill-stem test from 10,775-798 ft. recovered 90 ft. of salty mud and 900 ft. of muddy salt water with no shows of oil. Shell and The Texas Co. 3 Ratliff & Bedford, Section 15, Block A-54, Public School Land Survey, north outpost to the Bedford-Ellenburger field, Andrews County, took a 1-hour drill-stem test from 9,237-9,300 ft. There was gas in 25 minutes and recovery was 700 ft. of oil, 400 ft. of mud cut with oil and 200 ft. of drilling mud heavily cut with oil and gas. It was drilling below 9,319 ft. in lime.

Stanolind Oil & Gas Co. 1 Eva B. Kayser, Section 34, Block 43, T-2-S, T&P Survey, deep test west of the South Cowden pool of Ector County, topped the Ellenburger at 13,500 ft. This gives the test a datum point of minus 10,617 ft. on the top of the Ellenburger, compared to datum of minus 9,333 ft. in the Cities Service Oil Co. 1 J. E. Parker, Section 20, Block 44, T-2-S, T&P Survey, another deep test 8 miles west and slightly north. The Ellenburger was topped at 12,450 ft. in 1 Parker. Stanolind 1 Kayser was drilling below 13,557 ft. in dolomite.

Stanolind will drill a 6,800-ft. wildcat in Ector County 2¾ miles east of the North Ward field and 5 miles southwest of the

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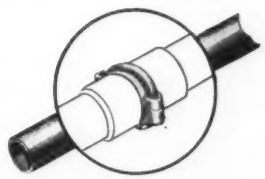

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Monahan field. It is 1-B Sealy-Smith Foundation, 660 ft. from the north and east lines of the northeast quarter of Section 81, Block A. G&MMB&A Survey. Argo Oil Corp. 1 Dora Roberts, Section 294, Block 13, H&GN Survey, southeastern Reeves County wildcat 11 miles northeast of Balmorhea, was drilling below 13,227 ft. in sand and shale.

Fullerton field, Andrews County, and Sharon Ridge field, Scurry County, each had four completions this week and Russell field, Gaines County, and Keystone-Colby field, Winkler County, and Howard-Glasscock field, Howard County, each had two. Fullerton field and Sharon Ridge field each had four locations, TXL-Ellenburger field, Ector County, each had three and Todd Deep field, Crockett County, Howard-Glasscock field, Keystone-Colby field and Taylor Link field, Pecos County, each had two. Fullerton field and TXL field each has 28 drilling wells; Keystone-Ellenburger field, Winkler County, 19; Welch field, Dawson County, 9; and Todd-Deep field has 8.

WEST TEXAS SUCCESSFUL WILDCAT

Fisher County: New oil pool—Skelly 1-A Huddleston, Sec. 11, Blk. 19, T&P Sur., 15 mi. NE Sweetwater, elev. 1,854 ft., flowed 696 bbl. day through open 2-in. tubing from 4,345-4,405 ft. Palo Pinto, gravity 40.9°, gas-oil ratio 873 to 1, TD 4,405 ft.

WEST TEXAS WILDCAT FAILURES

Crane County: Ray & Staniforth 1 W. E. Connell, Sec. 8, Blk. B-26, PSL, 1 mi. NW Sand Hills, elev. 2,700 ft., dry in Tubb, TD 5,125 ft.

Ector County: Brasted, Hyer & Hedburg 1 A. L. Henderson et al, Sec. 6, Blk. 43, T&P Sur., 1 mi. S Duoro, elev. 3,074 ft., San Angelo 5,565 ft., dry; TD 5,720 ft.

Hockley County: Honolulu 1 Glen Burson, Sec. 8, Blk. A, R. M. Thompson Sur., 4 mi. SE Smyer, elev. 3,354 ft., Glorietta 5,200 ft., dry, TD 6,978 ft.

Lamb County: Humble 1 C. A. Branton et al, Sec. 18, Blk. 1, R. M. Thompson Sur., 1 mi. NW Anton, elev. 3,432 ft., dry in Wichita, TD 6,685 ft.

Runnels County: Harley Sadler 1 Otto J. Halfmann, Sec. 501, GH&H Sur., 3 mi. SW Ballinger, elev. 1,697 ft., Ellenburger 4,278 ft., Hickory 4,770 ft., dry, TD 5,044 ft.

O. P. Leonard 1 C. W. Trammell, Sec. 115, ETRR Sur., elev. 1,869 ft., dry, TD 3,600 ft.

Upton County: Elder & Russell 1 fee, Sec. 94, Blk. Y, F. Rooney Sur., 10½ mi. NW. McCamey, elev. 2,678 ft., dry in San Andres, TD 2,805 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Repollo Oil Co. 1 Simmons, Section 25-21s-37e, wildcat 2 miles northeast of Eunice in east central Lea County, is dry at 8,757 ft. in Silurian lime and shale after it developed sulfur water in that formation. Rowan Drilling Co. and Neville G. Penrose 3 Walden, 15-22s-37e, 1⅛ miles southeast of production in the Brunson field, Lea County, flowed 148.5 bbl. of oil in 5 hours through perforations from 7,495-565 ft., or at the rate of 29.7 bbl. per hour, natural. The test checked 505 ft. high on the Ellenburger to the nearest producer in the field and may prove the opener of a new Ellenburger producing area for Lea County. On the northwest side of the Brunson area, Amerada Petroleum Corp. will drill 5 Corrigan, 1,980 ft. from the north and east lines of 4-22s-37e. It is scheduled to drill to around 7,800 ft. to explore the Ellenburger.

Drinkard field, Lea County, had two completions this week and Brunson and Caprock fields, Lea County, and Square Lakes field, Eddy County, each had one. Drinkard field had three locations and Grayburg-Jackson field, Eddy County, and Paddock field, East Lusk, Brunson and Langlie-Mattix fields, Lea County, each had one. Drinkard field has 15 drilling wells; Grayburg-Jackson field, 14; Paddock field, 9; Square Lakes field, 8; Langlie-Mattix field, 5, and Brunson and Maljamar fields, Lea County, 4.

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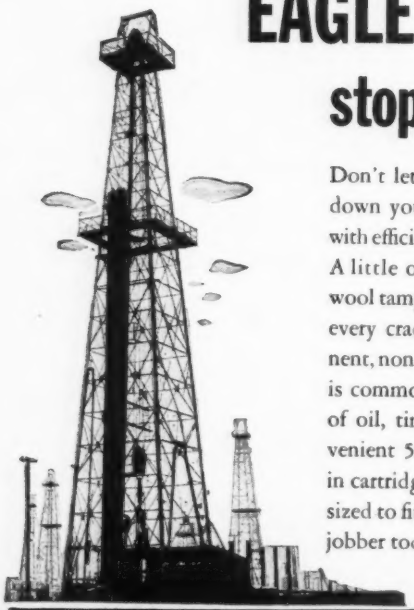

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N. CENTRAL TEXAS

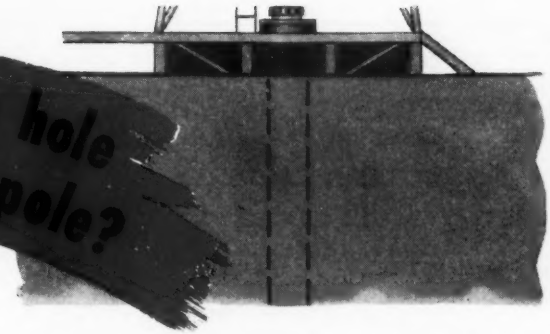
Caddo Discovery Logs Pay From 3,918-25 Ft.

WICHITA FALLS.—Fred M. Manning, Inc. 1 O. H. Parrott, Section 962, TE&L Survey, Caddo discovery 3 miles northwest of Woodson, Throckmorton County, has been completed. It flowed 109 bbl. of oil in 24 hours through 11/64-in. choke. Pay was logged from 3,918-25 ft. Casing pressure was 600 lb. and tubing pressure 250 lb. Fred M. Manning 1-D McKnight, Section 2, Day Land & Cattle Co. Survey, Abstract 2164, wildcat 6½ miles northwest of Woodson, was treated with 1,000 gal. of acid in the Caddo from 4,094-109 ft. It swabbed an estimated 25 bbl. of oil and 25 bbl. of water in 24 hours. It was installing pumping equipment. The well was plugged back to the Caddo after finding the Mississippian dry.

Fortex Oil Corp. et al 1 L. F. Wilson Est., Block 77, ATNCL Survey, Archer County discovery 5 miles northeast of Archer City, was completed on the pump for 100 bbl. daily from oil sand from 3,669-88 ft. Standard Oil Co. of Texas 1 A. G. Mitchell, J. B. McNair Survey, deep test 1½ miles northwest of Sherman, Grayson County, was drilling below 11,490 ft. in lime after core from 11,393-405 ft. recovered 12 ft. of brown dolomite.

National field, Wilbarger County, had

Does mud flow up the hole like a turning barber pole?



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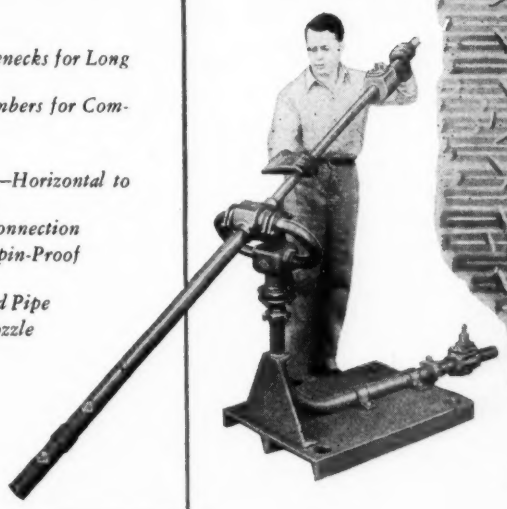

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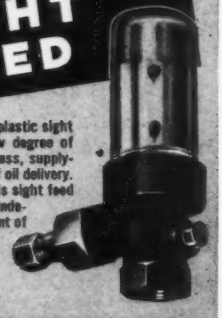

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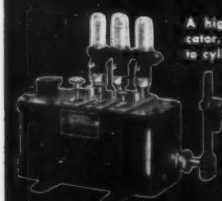

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three completions this week and Gatewood field, Cooke County, and Rose field, Haskell County, each had two. National field had 10 locations, Thornberry field, Clay County, Almon field, Cooke County, East Bryson field, Jack County, KMA and Electra fields, Wichita County, each had two. National field has eight drilling wells; Holliday field, Archer County, six; Sivell's Bend field, Cooke County, four, and Rose field, KMA field and South Vernon field, Wilbarger County, have three each.

In West Central Texas, V. E. Autry et al 1 W. A. Minter Est., Section 39, Block 2, SPRR Survey, has opened a new Swastika pool in Jones County 14 miles southwest of Anson. The discovery flowed 292 bbl. of 43° gravity oil daily on official test. Production was through 5/16-in. choke from 3,436-43 ft. Casing pressure was 140 lb. and tubing pressure 240 lb. Woodley Petroleum Co. et al 1 L. G. Davis is a new Ellenburger wildcat 8 miles southwest of Albany in Shackelford County. It is 330 ft. from the south line and 649 ft. from the east line of the north half of Section 39, Block 12, T&P Survey.

Santa Anna field had two completions, Eastland County Regular field and Manning-O'Conner field, Stephens County, each one. Manning-O'Conner field had two locations and Stephens County Regular field. Shackelford County Regular field and Lewis Steffins field, Jones County, each had one. Jones County Regular field has five drilling wells; Eolian field, Stephens County, and Lewis Steffins field each three, and Sanders field, Taylor County, Avoca field, Jones County, and Manning-O'Conner field each two.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Choate, Davis & Scholl 1 L. Hoff, Denton CSL Sur., Blk. 7, ¼ mi. E Holliday, elev. 1,056 ft., dry, TD 1,167 ft.

K. R. March 1 L. M. Stallcup, Lot 33, Blk. 5, Clark & Plumb Subd., 2 mi. S and 5 mi. E Archer City, elev. 1,020 ft., dry, TD 1,210 ft.

Texola Drlg. and J. W. Sorrells 1 Joseph Levy, DL&C Sur. A-961, 2 mi. S and 1½ mi. E Archer City, Caddo 4,844 ft., dry, TD 5,200 ft.

Clay County: Gus Blakely 1 B. V. Engle, M. B. Skerrett Sur. A-409, 2 mi. W and ½ mi. S Henrietta, dry, TD 765 ft.

Sussex Oil Co. 1 W. A. Henderson, D. E. Brannon Sur., 2½ mi. N and 5½ mi. W Petrolia, elev. 903 ft., dry, TD 1,144 ft.

Cooke County: E. L. Gill 1 Nora Enderby, J. H. Selkirk Sur. A-912, 3 mi. S and ½ mi. W Lindsay, elev. 861 ft., Ellenburger 1,942 ft., dry, TD 2,252 ft.

W. F. Russell et al 2 Lee Blocker et al, J. Rodriquez Sur., 2 mi. S and 1 mi. E Myra, elev. 843 ft., Ellenburger 1,720 ft., dry, TD 1,731 ft.

Jack County: Hanlon-Buchanan 2 Antelope, Sec. 2, SPRR Sur. A-1476, 4½ mi. S and 5½ mi. E Antelope, dry, TD 750 ft.

Jack L. Story, Jr. 1 Singleton, M. Rockerfellow Sur., 2 mi. NW Antelope, elev. 1,031 ft., dry, TD 780 ft.

Montague County: J. M. Garrett et al 1 Varner Pittman, Jas. Ferguson Sur., 7 mi. N Saint Jo, elev. 950 ft., dry, TD 2,222 ft.

Wichita County: Geo. Proctor 4-F Ed Foster, T. H. Barwise Sur. A-633, 2 mi. E and 6 mi. N Fowlkes, elev. 1,126 ft., dry, TD 1,134 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

Nolan County: New oil pool—Sohio Pet. Co. 1 Irl Faver, Sec. 50, Blk. 21, T&P Sur., 6 mi. SE Sweetwater, elev. 2,125 ft., pumped 10 bbl. day through open 2-in. tubing from 5,671-82 ft. oil sand, gravity 41.8°, TD 5,836 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Erath County: J. E. Cheek 1 Mrs. Lucy Russell, A. Ewing Sur., 6½ mi. SE Thurber, dry, TD 2,030 ft.

Jones County: H. V. Snowden 1 Mrs. L. P. Young, Subd. 2, Goliad CSL Sur. No. 359, 2¼ mi. S Neinda, elev. 1,819 ft., Flippen 2,852 ft., dry, TD 2,887 ft.

H. W. Snowden et al 1 G. W. Poe, Sec. 1, Goliad CSL Sur. No. 358, ¾ mi. SE Neinda, elev. 1,804 ft., Flippen 2,847 ft., dry, TD 2,854 ft.

Ted Weiner and Pan-Am Prod. Co. 1 T. B. Gray, Sec. 25, D&DAL Sur., 1¼ mi. SW Avoca, elev. 1,570 ft., King 2,140 ft., dry, TD 2,178 ft.

Stephens County: Bennett & Sorrells 1 Earl Edwards, Subd. 1, Blk. C, SPRR Sur., 9¼ mi. SW Eolian, elev. 1,424 ft., Caddo 3,380 ft., dry, TD 3,455 ft.

Taylor County: Hedrick Oil Co. 2 Teaff, Subd. 14, Grimes CSL Sur. No. 124, 2½ mi. NE Merkel, elev. 1,869 ft., dry, TD 1,350 ft.

CALIFORNIA

Spurt in Drilling Activity Brings 48 New Locations

LOS ANGELES.—A surge in California drilling activity last week indicated by announcement of 48 new locations possibly signifies a slight increase in delivery of tubular goods to the West Coast. Literally scores of operations are deferred in Pacific Coast fields and wildcat territories because of the inability to obtain unrestricted delivery on casing. The number of new drilling operations announced last week has not been exceeded for several months. Completion of British-American Oil Producing Co. and The Texas Co. 1 Bodger for production of more than 1,000 bbl. daily confirmed the previous credit given for a discovery in the Gardena area of Los Angeles. The most recent production report credits the well with flowing 1,040 bbl. of 26°-gravity oil on 18 to 22/64-in. choke. For additional information concerning this discovery see Week's Highlights, page 125 of this issue.

North of the Huntington Beach pool, A. W. Lyddon, Los Angeles operator, who opened a new spot for production several weeks ago, has made three locations and will further explore productive potentialities. Lyddon 2 Anaheim Sugar is to be drilled 990 ft. north and 330 ft. east of the center of Section 7-6s-10w. His 7-1 Holtz will be drilled 330 ft. north and west from the center of the section and 7-1 Irvine will be 330 ft. south and east from the same point of origin.

Wilshire Oil Co. was reported last week preparing to drill a wildcat test between Osnard and Camarillo in Ventura County.

The Wilmington area of Los Angeles County continued leadership in new drilling activity. Thirteen of the week's 48 new operations were at Wilmington. Continental Southern Corp. and Continental Northern Corp. will drill 10 new wells on its drainage-canal lease. Additional drilling is scheduled for the Midway-Sunset pool and for South Belridge.

The closely watched deep "no dope" well in the South Belridge field, Belridge Oil Co. 62-W-33, is drilling and spot coring at 13,450 ft. An even deeper test in Kern County is Pacific Western Oil Corp. et al 1 National Royalties, in the Miramonte area, which is drilling at 13,795 ft. Operators are making between 50 and 75 ft. of hole per day and have no definite stopping objective.

SUCCESSFUL CALIFORNIA WILDCATS

Ventura County, Del Valle area: Bankline Oil Co. 101 Black, 13-4n-18w, pumped 105 bbl., 26.1° gravity, TD 2,427 ft.

Los Angeles County, Gardena area: British-American Oil Producing Co. and Texas Co. 1 Bodger, 22-3s-14w, flowing 1,040 bbl., 26° gravity, TD 9,154 ft. Conglomerate discovery.

East Lost Angeles area: Richfield Oil Corp. 2 Vail, 16-2s-12w, pumping 145

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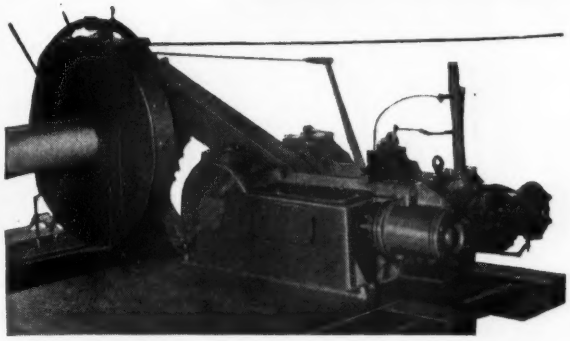

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bbl., 34.4° gravity, 5 per cent cut; TD 9,238 ft., 2½-in. tubing 5,011 ft.

Orange County, West Newport: Meeker & Gardner 1 Deeble, 13-6s-11w, gun perf. 3,647-80, 3,714-19 and 3,735-50 ft. Flowing 400 bbl., 26° gravity, 20 per cent cut, ¾-in. choke, TD 3,830 ft.

Kern County, Sheep Springs area: The Texas Co. 1 Anderson, 20-29s-21e, flowing 400 bbl., 20° gravity, 10 per cent cut, 1-in. choke; top Carneros, 2,726 ft., TD 2,863 ft.

San Joaquin County, Thornton area: Amerada Petroleum Corp. 2 Thornton unit, 28-5n-5e, 9,664,000 cu. ft. gas; shut-in pressure, 1,385 lb., TD 3,400 ft.

UNSUCCESSFUL CALIFORNIA WILDCATS

Orange County, Huntington Beach area: R. W. Jerman 1 Gothard, 27-5s-11w, gray Ashton sand, 6,303-13; TD 6,370 ft., dry.

Solano County, Cache Slough area: Amerada Petroleum Corp. 3 Church, 1-4n-2e, TD 6,200 ft., dry.

Fresno County, Cantua Creek area: Bankline Oil Co. 1 Kenyon, 4-17s-15e, Vaqueros wet, TD 6,675 ft., dry.

Santa Barbara County, Gaviota area: Barnsdall Oil Co. and Honolulu Oil Co. 1 Petan, 5-5n-32w, TD 4,986 ft., dry.

Goleta area: Ohio Oil Co. 1 Prevedello, 1-4n-28w, dry, TD 3,266 ft.

CANADIAN FIELDS

Wells in Elk Point Section May Prove Large Area

CHATHAM. — Syndicate operations by Anglo-Canadian Oil Co., Home Oil and Calgary & Edmonton Corp., in northern Alberta, will likely be extended as a result of tests now in progress at two wells in the Elk Point section. Elk Point 1-A, LSD 7, 26-56-5w4, bottomed at 2,141 ft., has bailed down and is gun-perforating casing at the lower Cretaceous. Elk Point 2, LSD 3, 14-57-6w4, is making drill-stem test in the same horizon at 1,594 ft. With locations about 7 miles apart, the two wells indicate potential production over a considerable area.

Keho Lake.—In the Keho Lake area, southern Alberta, Okalta-Keho 1, LSD 1, 16-11-22w4, drilled to 4,977 ft., bailed water in the Madison lime. The test may be deepened to the Devonian, or plugged back to test oil shows met in the Bow Island sand.

Stolberg.—In the central Alberta foothills, Imperial-Shell-Stolberg 1, LSD 3, 22-41-14w5, with a record depth of 13,747 ft., has plugged back and is testing upper and lower porous horizons of the Madison limestone. The first lime was met at 12,218 ft. and the second at 12,827 ft.

Lloydminster. — An important extension of the Alberta section of the Lloydminster field is indicated by Lloydminster Oil Producers 3, LSD 13, 11-50-2w4. The hole was drilled to 1,998 ft. and 7-in. casing set at 1,994 ft. It encountered a 5-ft. sand with heavy saturation in the lower Cretaceous. Location is in the Ribstone-Blackfoot area and extends the field several miles to the northwest.

Steveville.—In the south end of the Steveville-Princess field, South Princess Joint Venture C.P.R. 2, LSD 4, 4-19-11w4, encountered water in drill-stem test of the Jefferson formation, and has plugged back to the Madison limestone. In the latter formation a 480-ft. rise was obtained in an hour's test, with no water. Potential production is estimated around 140 bbl.

Maidstone. — In Essex County, Ontario, Imperial Oil has taken up oil and gas rights on 1,375 acres in Maidstone Township. Leases for 10 years are subject to one-eighth oil royalty with cash payments for natural gas production and annual

rentals on undrilled land of 50 cents an acre. The area will be developed as part of the widespread Imperial Oil drilling campaign in eastern Canada, and it is thought drilling may uncover a northerly extension of the once important Essex oil and gas fields opened near Kingsville more than 40 years ago.

SOUTH LOUISIANA

New Producing Horizons Found in Three Fields

NEW ORLEANS.—Three new oil sands were opened this week in the South Louisiana district.

A new deeper producing horizon in the deep Mamou Wilcox field of Evangeline Parish was brought into commercial oil production by Magnolia Petroleum Co. 1 L. F. Duos, ¾ mile southwest of the 1 Morein, discovery well, and in 6-5s-1e. Drilled to a total depth of 12,037 ft., this well flowed a potential of 259 bbl. of oil per day through an 8/64-in. choke, tubing pressure 3,775 lb., gravity 47°, no water. Wilcox was topped at 11,505 ft., with the Morein discovery sand also showing oil from 11,550-76 ft. Production is through 40 perforations at 11,780-90 ft.

Another deep oil-producing sand was found in Tide Water Associated Oil Co. 32 Buras Levee district at Venice field, and it flowed a potential of 260 bbl. of oil per day through a 9/64-in. choke, gravity 35°, with 2,300 lb. flowing pressure and a gas ratio of 1,200 to 1. Total depth is 12,192 ft., with production through perforations at 11,775-11,805 ft.

At Black Bayou field in Cameron Parish, Shell Oil Co., Inc., 64 Watkins, 8-12s-12w, opened a new deep pay zone, flowing 253 bbl. per day of 39°-gravity oil through a ⅛-in. choke. Total depth is 8,000 ft. with top of sand at 7,130 ft. Production is through perforations at 7,130-60 ft.

Grubb & Hawkins 1 Clenny Savoy, 45-7s-1e, wildcat north of production in the Bayou Mallet field area of Acadia Parish, has been completed dry at a depth of 9,505 ft. after making only slight shows from two new sands for the area. It tested salt water with a slight show of oil at 9,102-10 ft. and salt water and a slight show of gas from 9,058-70 ft.

There were 19 new locations reported this week, 4 being wildcats, 2 in Vermilion, and 1 each in Tangipahoa and Terrebonne parishes. Evangeline Parish led with a total of three producers, all in Mamou pool, while Acadia and Cameron parishes each received two completions. Acadia Parish received four new locations, Vermilion, St. Mary, Terrebonne and Jefferson each received two, while Ascension, Assumption, Calcasieu, Cameron, Evangeline, St. Martin, and Tangipahoa received one each.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Cameron Parish: New oil sand, Black Bayou field—Shell Oil Co., Inc., 64 Watkins, 8-12s-12w, TD 8,000 ft., top sand 7,130 ft., perf. 7,130-60 ft., PT 253 bbl. per day through ⅛-in. choke, gas-oil ratio 842 to 1, TP 1,275 lb., gravity 39°, no water.

Evangeline Parish: New oil sand, Mamou field—Magnolia Pet. Co. 1 Hilde Deshotel, ½ mi. NW of discovery well, NW NE 7-5s-1e, TD 12,037 ft., top sand 11,762 ft., perf. 11,768-72 ft., PT 259 bbl. oil per day through 8/64-in. choke, TP 3,775 lb., gravity 47°, no water.

Plaquemines Parish: New oil sand, Venice field—Tide Water Assoc. Oil Co. 32 Buras Levee district, 28-21s-30e, TD 12,192 ft., top sand 11,775 ft., perf. 11,775-11,805 ft., PT 260 bbl. oil per day through 9/64-in. choke, gas-oil ratio 1,200 to 1, TP 2,300 lb., gravity 35°, 0.1 per cent water.

SOUTH LOUISIANA WILDCAT FAILURES

Cameron Parish: Texas Co. 1 Lutcher-Moore Lbr. Co., 24-14s-12w, dry, TD 11,001 ft.

East Baton Rouge Parish: Union Producing Co. 1 E. L. East Est., 52-4s-1w, top Wilcox 9,413 ft., dry, TD 11,235 ft.

ILLINOIS

Wabash County Wildcat Flows 81 Bbl. an Hour

MATTOON.—The Sam Malis 1 W. L. Litherland, NW NW SE 20-1n-13w, Wabash County wildcat about 2 miles northwest of production in the Friendsville field, shows promise of opening a large new area for development. A saturated section was encountered in the Levias lime and was perforated with 48 shots from 2,720-32 ft., total depth 2,808 ft. Then on a 6-hour test the well flowed 81 bbl. of oil an hour, or at the rate of 1,944 bbl. a day. If this rate of production holds up on initial tests, the well will be one of the largest completed in Illinois in more than 6 months. Nearest dry holes to the 1 Litherland are about 1½ miles to the northeast and about the same distance to the southwest. With this large untested area, this could easily develop into one of the major discoveries of recent months. The test is now shut down for tankage.

Gallatin County's prospective pool opener, the Joe Reznik et al 1 Arnold Valter, S½ SE NE 3-9s-9e, is installing pumping equipment for a test of the Aux Vases sand at 2,726-39 ft. A previous swab test of this zone showed 5 to 8 bbl. of oil an hour natural. It is located about 3 miles from nearest production in the Junction pool, and operators estimate it will make about a 100-bbl. pumper when completed.

ILLINOIS SUCCESSFUL WILDCATS

Cumberland County: National Associated Petroleum Co. 1 Krogmann, NW NE SE 31-9n-7e, pumped 140 bbl. oil, natural, McClosky 2,446-50 ft., pay 2,450-54 ft., TD 2,454 ft., discovery well Lillyville pool.

Wayne County: A. J. Stagter 1 Trotter, SW SE NE 20-1n-8e, pumped 66 bbl. oil and 7 bbl. water, 2,000 gal. acid, reacidized 5,000 gal., McClosky 3,100 ft., TD 3,103 ft.

White County: W. J. Lewis 1 Bingham et al, SW NW SW 17-5s-9e, pumped 65 bbl. oil and 144 bbl. water, Aux Vases sand 3,162 ft., 50-qt. shot 3,164-70 ft., TD 3,173 ft., PB 3,165 ft.

ILLINOIS WILDCAT FAILURES

Champaign County: D. K. Roth 1 C. Beberich, SE NE NE 6-22n-8e, dry at 1,100 ft., Silurian 530 ft., Maquoketa 1,007 ft.

Coles County: J. Carlson 1 R. King, NW NW SW 35-12n-9e, dry at 1,904 ft., Glen Dean 1,486 ft., Cypress sand 1,627 ft., Aux Vases sand 1,821 ft., Ste. Genevieve 1,840 ft., McClosky 1,900 ft.

Tex Harvey 1 Bariether, SE SW NW 35-13n-7e, dry at 3,193 ft., Aux Vases sand 1,880 ft., Ste. Genevieve 1,920 ft., Rosiclare 1,930 ft., Louisiana 3,038 ft., Chattanooga 3,053 ft., Devonian 3,154 ft.

Cumberland County: A. V. Stephens 1 T. Hoffman, NW NE NW 34-11n-7e, dry at 2,161 ft., Tar Springs 1,654 ft., Glen Dean 1,733 ft., Barlow 1,829 ft., Cypress sand 1,889 ft., Paint Creek 1,950 ft., Renault 2,007 ft., Aux Vases sand 2,012 ft., Ste. Genevieve 2,055 ft., Rosiclare 2,080 ft., Fredonia 2,102 ft.

Fayette County: Shulman Bros. 1 Williams, SE NE NW 6-6n-2e, dry at 2,021 ft., Glen Dean 1,474 ft., Cypress sand 1,642 ft., Paint Creek 1,687 ft., Benoist 1,749 ft., Renault 1,793 ft., Aux Vases sand 1,804 ft., Ste. Genevieve 1,891 ft., Rosiclare 1,918 ft., Fredonia 1,940 ft.

Macon County: C. G. Davis 1 Boyd, NE NE SE 29-17n-3e, dry at 2,280 ft., Ste. Genevieve 1,319 ft., Louisiana 2,060 ft., Chattanooga 2,142 ft., Silurian 2,209 ft.

Richland County: George Engle 1 M. W. Wynn, NW SW NE 30-2n-10e, dry at 3,319 ft., Menard 2,373 ft., Waltersburg 2,446 ft., Tar Springs sand 2,514 ft., Glen Dean 2,590 ft., Hardinsburg 2,656 ft., Cypress 2,876 ft., Renault 3,118 ft., Ste. Genevieve 3,176 ft., St. Louis 3,293 ft.

Wabash County: Wayne Drlg. Co. 3 Richardson, SW SW SE NW 36-2s-14w, dry at 2,900 ft., Renault 2,715 ft.

White County: Just Rite Drlg. Co. 1 Emma Bruggen, NE NW SW 13-5s-10e, dry at 3,207 ft., Aux Vases sand 3,044 ft., Ste. Genevieve 3,087 ft., Levias 3,100 ft., McClosky 3,150 ft.

MISSISSIPPI

Mississippi Activity Remains at High Level

JACKSON.—This week's activity in Mississippi remained practically unchanged, with 5 completions, 3 of which were wildcats, 18 active wildcats and 56 field wells in operation.

In Lamar County, Texas Co. 1 Bilbo, 7-1n-16w, was drilling below 6,525 ft., and Gulf Refining Co. 3 Bass, 8-1n-16w, was drilling in sand at 7,780 ft.

Roeser & Pendleton, Inc., 1 Columbus Lumber Co., 20-6n-6e, Lincoln County, recovered salt-water sands in stringers above the Massive sand formation, and was abandoned as dry at 10,706 ft.; the same firm's 1 Ballard, C SW SW 17-7n-7e, Lincoln County, was drilling below 9,380 ft.

MISSISSIPPI WILDCAT FAILURES

Issaquena County: Plymouth Oil Co. 1 Anderson-Tully, C S½ SE NW 13-9n-9w, dry, TD 5,001 ft., Sparta 1,033 ft., Wilcox 1,950 ft., Midway 3,146 ft., conglomerate 3,516 ft., Paluxy 3,552 ft., Glen Rose 3,982 ft., lime 4,326-32 ft., Massive anhydrite 4,358-4,466 ft., sand

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington, 25, D. C. Notice is hereby given that sealed bids will be received until 1 P.M. Wednesday, September 11, 1946, for land described herein situated within the known geologic structure of the Kern River oil field, M.D.M., California. This land is offered to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act as amended by the Act of August 21, 1935 (49 Stat. 673, 30 U.S.C. sec. 226), in the following parcels: Parcel No. 1, T. 28 S., R. 27 E., sec. 24; N½SE¼, 80 acres. Parcel No. 2, T. 28 S., R. 28 E., sec. 18, NE¼, 160 acres. Total 240 acres. Bids must be submitted on each parcel separately; but if both parcels are awarded to the same bidder, they may be included in a single lease. Each bidder must submit with the bid one-fifth of the amount bid in cash, or by certified check, made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease, required under 43 CFR 192.19. The envelopes should be plainly marked, "Bid for Parcel No.... Kern River oil field, California. Not to be opened before 1 P.M. September 11, 1946." No bids received after the hour fixed herein for submitting bids will be considered. The remainder of the bonus and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished by a successful bidder prior to the issuance of a lease. The deposits of the other bidders will be returned upon acceptance of the successful bids. The successful bidder will be required to agree not to discriminate against any employe or applicant for employment because of race, creed, color, or national origin, and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Fred W. Johnson, Director.

4,690-4,785 ft., 4,820-40 ft. and 4,890-4,940 ft.

Warren County: McAlester Fuel Co. 1 Anderson-Tully Lumber Co., NE NE 35-18n-1e, dry, TD 7,009 ft., Massive anhydrite 6,530-6,698 ft., sand 6,794-6,826 ft., 6,868-78 ft., 6,899-6,918 ft. and 6,934-58 ft.

Wayne County: I. P. LaRue 1 Robinson Lumber Co., NE NW 20-6n-6w, dry, TD 7,827 ft., Sparta 1,180 ft., Wilcox 1,684 ft., Midway 4,130 ft., sand 6,080-6,192 ft., Tuscaloosa 6,297 ft., Marine Tuscaloosa 7,258 ft., Massive sand 7,611 ft.

FLORIDA WILDCAT FAILURE

Franklin County: Pure Oil Co. 2 St. Joe Paper Co., NW SW NE 34-6s-4w, dry, TD 4,787 ft., no tops reported.

LA.-ARK.

Slight Rise in Weekly Completions Reported

SHREVEPORT. — The North Louisiana-Arkansas area reported 24 completions during the past week, 11 oil wells, 4 gas wells and 9 dry holes. Five of the dry holes were wildcat tests. These completions brought the cumulative figure for total completions for 1946 up to 611, including 108 wildcats.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: W. O. Weaver 1 Lodwick Lumber Co., SE SE NW 35-19n-11w, dry, TD 936 ft., Arkadelphia 830 ft., Nacatoch 912 ft., Nacatoch sand 934 ft.

Madison Parish: C. H. Murphy, Jr. and Sun Oil Co. 1 L. E. Clark, NE NW NE 17-17n-12e, dry, TD 5,809 ft., Sparta 1,033 ft., Cane River 1,677 ft., Wilcox 2,128 ft., Midway 3,320 ft., Tuscaloosa 3,795 ft., sand 3,795-97 ft. and 3,818-39 ft. with no shows, Paluxy 3,839 ft., Upper Glen Rose 5,398-5,407 ft., lime 5,534-40 ft., porous sand 5,643-54 ft. and 5,664-5,705 ft. with no shows, Massive anhydrite 5,745 ft.

Richland Parish: Homer Hurley et al 1 Singer Mfg. Co., C NW NW, 21-18n-8e, dry, TD 4,016 ft., chalk 2,830 ft., Lower Cretaceous 2,890 ft., white sand 2,920 ft.

Pan American Petroleum Co. 2 Geo. B. Franklin & Son, C E/2 SE NE 34-18n-8e, dry, TD 4,003 ft., Cook Mountain 480 ft., Sparta 996 ft., Cane River 1,265 ft., Wilcox 1,565 ft., Midway 2,302 ft., Glen Rose 2,794 ft., Travis Peak 3,486 ft.

SOUTH ARKANSAS WILDCAT FAILURE

Ouachita County: Raymond D. Reynolds 1 Robinson, C SE SE SE 36-14s-19w, dry, TD 2,653 ft., Nacatoch 1,360 ft., Saratoga 1,630 ft., Base Annona 1,898 ft., Buckrange sand 2,047 ft., Tokio 2,260 ft.

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OKLAHOMA

New Field in Prospect In Garvin County

GARVIN County had promise of another new oil field late last week when the Carter Oil Co. 1 Burford, NW NW 5-1n-1w, flowed at an estimated rate of 10 bbl. of 41.5°-gravity oil an hour on a drill-stem test of the Pennsylvanian sand. Prior to the test, a core from 6,085-94 ft. recovered 8 ft. of solid oil sand, very coarse and porous with small holes and bubbles of gas. The drill-stem test, of 17 minutes duration, was made of the interval from 6,081-94 ft., and flowed gas in 2 minutes, oil in 10 minutes, with 360 ft. of clean oil retained in the drill string. Gas flow was estimated at 2,000,000 cu. ft. per day. Shut in pressure was recorded at 2,800 lb. and bottom hole flowing pressure at 1,500 lb. Located approximately 3 miles northwest of shallow Pennsylvanian production in the Northwest Hoover pool, the well was originally scheduled to go to 8,000 ft. At present it is coring ahead in the oil sand.

Western Oklahoma gained another important new deep wildcat last week when the Shell Oil Co. announced it will start operations immediately on the 1 Joe G. Walters, NE SW 14-10n-21w. The new test is located about 5 miles south of Elk City in Beckham County. It is also approximately 5 miles northwest of Continental Oil Co.'s 14,582-ft. test which was abandoned after a series of tests in lower formations.

OKLAHOMA SUCCESSFUL WILDCATS

Lincoln County: Hubbell & Webb 1 G. Smith, SE NE SE 3-14n-16e, flowed 6 bbl. of oil per day from Wilcox at 4,042-54 ft., Cleveland 2,090 ft., Oswego 2,845 ft., Verdigris 2,970 ft., Inola 3,500 ft., brown lime 3,640 ft., Mississippi lime 3,755 ft., Woodford 4,018 ft., Sylvan 4,067 ft., TD 4,075 ft.

Texas 1 W. R. Yeldell, SE NW NW 11-14n-6e, produced 10,000,000 cu. ft. of gas from Hunton at 4,040-48 ft., Layton 1,800 ft., Cleveland 2,106 ft., Oswego 2,867 ft., Prue 2,915 ft., sand 3,642 ft., Mayes 3,765 ft., Woodford 4,008 ft., Sylvan 4,052 ft., TD 4,060 ft.

McClain County: Big Chief Drilling Co. 1 Stephens, C SE SW 24-5n-2w, flowed 236 bbl. of oil per day through 13/64-in. choke from sand at 6,540-48 ft., discovery well, Hogshooter 5,180 ft., sand 5,466-71 ft. with no show, Deese 5,785 ft., sand 6,030-55 ft. and 6,533-58 ft., Sulvan 7,114 ft., Bromide dense 7,640 ft., sandy dolomite 7,760 ft., TD 7,977 ft.

Seminole County: R. O. Olsen Oil Co. et al 1 Madole, NW NW NW 26-9n-5e, flowed 353 bbl. of oil per day from Earlsboro at 3,405-30 ft., gravity 34°, no other tops reported, TD 3,434 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: W. F. Turner 1 Jenny Woerz, NE NW SW 7-5s-1e, dry, TD 5,234 ft., broken sand 2,995-3,012 ft. with a slight stain.

Cotton County: Burk Royalty 1 Warren, SW SW NW 3-5s-10w, dry, TD 1,884 ft., no tops reported.

E. W. Whitaker and J. W. Carter 1 Graham, SW SE SE 5-4s-11w, dry, TD 1,935 ft., sand 1,682-1,720 ft., 1,720-35 ft. and 1,784-96 ft., lime 1,796-1,802 ft., sand 1,818-28 ft. with no show.

Haskell County: Phillips Petroleum Co. 1 Sammon, C SE NE 22-9n-21e, dry, TD 5,734 ft., sand 2,180 ft., soft sand 4,563 ft. with a slight stain, Cromwell sand 4,936 ft., Mayes 5,280 ft., Woodford 5,390 ft., Hunton 5,462 ft., Sylvan 5,590 ft., Viola 5,623 ft., dolomite 5,698 ft., Wilcox 5,702 ft.

Lincoln County: Four States Oil 1 James, NW NW SE 1-12n-5e, dry, TD 4,712 ft., Hogshooter 2,090 ft., Layton 2,219 ft., Oswego 3,336 ft., Pure 3,358 ft., Inola 3,780 ft., Bartlesville 3,805 ft., Caney 4,065 ft., Mayes 4,180 ft., Woodford 4,369 ft., Hunton 4,406 ft., Sylvan 4,495 ft.

Okfuskee County: W. M. Dunn 1 Crawley & Morgan, NW NW SE 36-11n-10e, dry, TD 3,317 ft., no tops reported.

Stephens County: T. H. McCasland et al 1 Payne "B," NE NE SW 19-1n-5w, dry, TD 3,511 ft., sand 2,085-89 ft.

Seminole County: Mid-Continent Petroleum Corp. 1 Markwell, SW NW SE 28-9n-7e, dry, TD 3,687 ft., Calvin sand 2,242 ft.,

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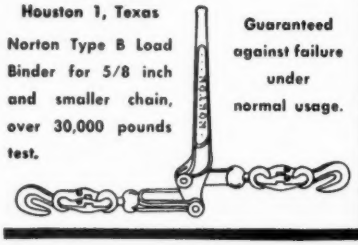

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Tillman County: Acme Machine & Die 1 Mattie D. Lundy, SW SW NE 4-3s-19w, dry, TD 5,592 ft., lime and sand 5,182-93 with a show of oil, Arbuckle 5,562 ft.

OHIO, KENTUCKY

Medina Sand Gas Pool Again Extended

COLUMBUS.—B. G. Davis et al extended the Medina sand gas pool in Bearfield Township, Perry County, another ½ mile to the south by their 1-C Murray Penrod, Section 27. Clinton sand at 3,843-93 ft. came in at 500,000 cu. ft. which blew down; Medina sand, 3,956-61 ft., gaged 1,006,000 cu. ft. natural. North and east offsets to the well are planned.

Preston Oil 1 Curry-Hammer, Section 3, Clayton Township, Perry County, was shot after standing for some time, and made 47 bbl. of oil and 297,000 cu. ft. gas.

Atha Realty 6 C. S. Sherman, Section 17, Harrison Township, Perry County, topped the Clinton at 4,298 ft. and at 4,308 ft. had 5,000,000 cu. ft. gas.

Of the 17 new locations for the week, Sandyville reported 5, Ashland 4, Brush Creek and Mt. Vernon 3 each, and Cambridge and Lancaster 1 each. Cambridge field led in completions with 11 out of 22.

EASTERN KENTUCKY

ASHLAND.—The William Stanley well 5655 in Pike County, completed by Kentucky-West Virginia Gas Co., was the only major activity noted during the week.

The well was brought in at 3,517 ft. and completed for 207,000 cu. ft. of gas in shale, and 15,000 cu. ft. in Big lime.

Locations were noted on the Richard Stanley property, Pike County; Harvey Johnson, Floyd County; H. C. Short, Knott County; Gholson Howard, Magoffin County.

WESTERN KENTUCKY

OWENSBORO.—The Hoosier Drilling Co. 1-D C. A. Dempewolf, NE NE NE 18-P-27, Henderson County wildcat, is drilling ahead at 2,130 ft. after setting 7-in. casing at 2,070 ft. This well is scheduled to be a deep test and will be the first drilled in this area.

The western Kentucky area reported only three completions during the past week, one oil well and two dry holes. One of the dry holes was a wildcat test. New operations announced during the week included four in Davies County and one each in McLean, Union and Webster counties.

WESTERN KENTUCKY WILDCAT FAILURE

Henderson County: Carter Oil Co. 1 J. L. Conley, SW SW NW 10-O-22, elev. 413 ft., dry at 2,748 ft., Menard 1,667 ft., Tar Springs 1,825 ft., Glen Dean 1,964 ft., Paint Creek 2,370 ft., Renault 2,431 ft., Ste. Genevieve 2,545 ft., Fredonia 2,582 ft.

INDIANA

EVANSVILLE.—Gibson County's prospective pool opener, the J. C. Haynes et al 2 E. Crecelius, SW SW 5-2s-10w, is conditioning hole to reset pipe on the McClosky lime at 2,076-80 ft., total depth. Latest reports indicate that this well flowed at the rate of 50 bbl. of oil a day.

Indiana completions remained at a high level for the past week with a total of 10 wells reported. Seven of the completions were oil wells while the remainder were dry. No wildcats were reported. New operations announced during the week included three each for Gibson, Pike and Vanderburgh counties, two for Spencer, and one for Posey County.

KANSAS

Oil Flow Increases in Ellis County Wildcat

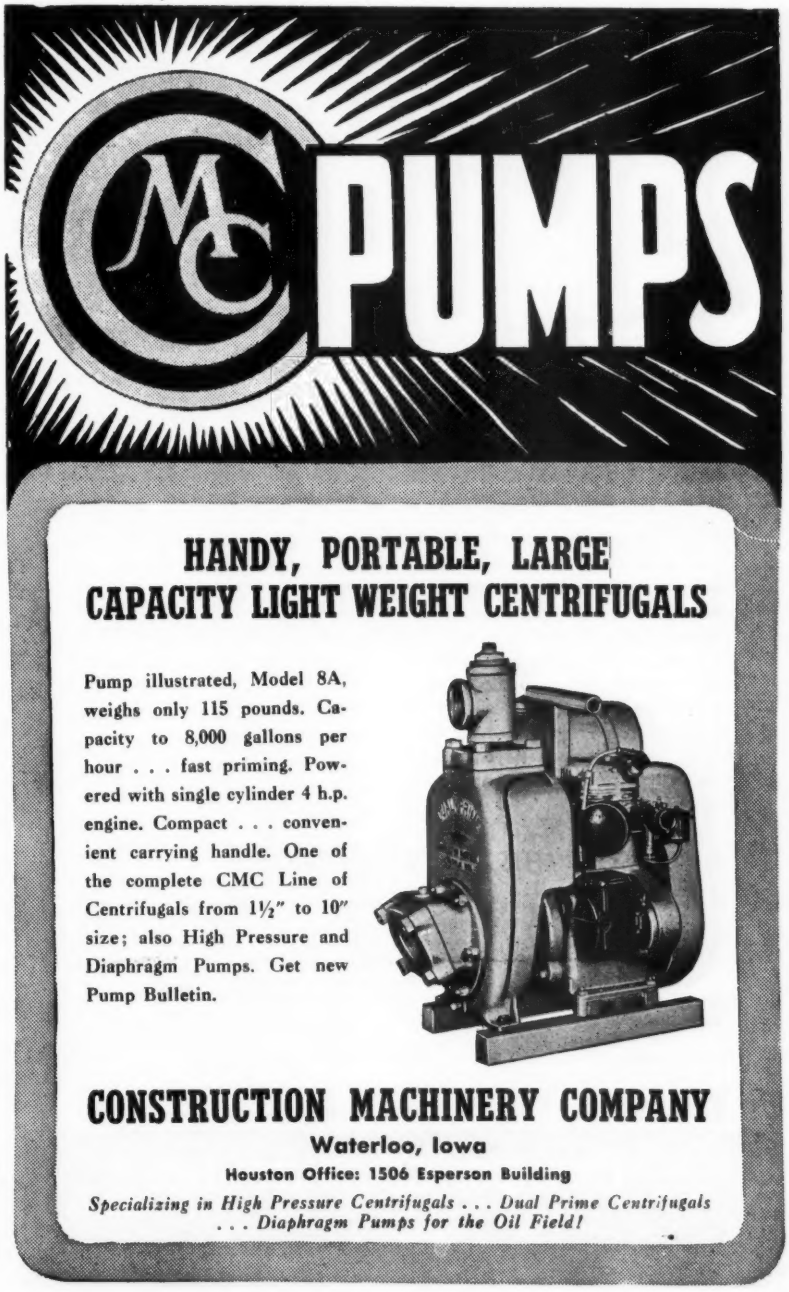
PRODUCTION in the J. C. Farley 1 Weisner, SE SE SE 26-13-20w, Ellis County wildcat, increased from 1 to 3 bbl. of oil an hour last week when operator deepened the test 3 ft. to a new total depth of 3,815 ft. Production is from the Arbuckle at 3,798 ft., and preparations are now being made to acidize this formation. The 1 Weisner is about 1 mile northwest of production in the Pleasant pool in the western part of the county.

Lion Oil Co. 1 Chance, NW NW NW 4-27-13w, new Pratt County discovery, has been assigned a potential of 203 bbl. of oil daily. Production is through perforations opposite the Arbuckle at 4,432-40 ft. The well was acidized with 3,000 gal. before potential test. A north offset to the discovery, the Lion Oil Co. 1 Jo, SW SW SW 33-26-13w, is drilling ahead below 2,900 ft.

A second Viola lime producer was completed during the past week in the Paden pool of northeastern McPherson County. The new well is the Anderson-Prichard 6 Schultz, SW SW NW 15-18-1w, which was completed for a potential of 198 bbl. per day. This compares with 232 bbl. per day produced by the same company's 5 Schultz, discovery well of Viola production in the pool.

KANSAS SUCCESSFUL WILDCAT

Butler County: J. P. Gaty 1 Showalter, NE NW SW 23-28s-3e, pumped 40 bbl. of oil per day from Simpson sand at 3,001-03 ft., gravity 35°, Kansas City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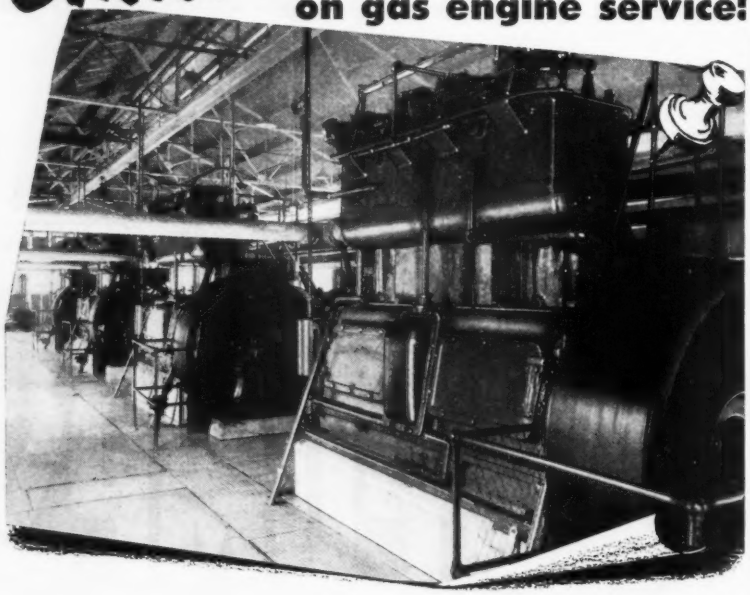

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KANSAS WILDCAT FAILURES

Barton County: C. E. Ash 1 Moses Estate, SW SW NW 35-17s-13w, dry, TD 3,410 ft., anhydrite 775 ft., brown lime 3,139 ft., Lansing-Kansas City 3,155 ft., Arbuckle 3,386 ft. with stain of oil.

Cowley County: Earl Wakefield 1-A Ogilbee, SW NE NE 7-32s-4e, dry, TD 1,980 ft., sand 1,965 ft.

Marion County: Joe Morine 1 Theis, SW SW SW 14-19s-4e, dry, TD 2,386 ft., Lansing-Kansas City 1,760 ft., Kansas City 1,810 ft., Mississippi lime 2,330 ft.

Rooks County: Cities Service Oil Co. 1 Milner, SW SW NE 17-8s-78w, dry, TD 3,517 ft., Lansing-Kansas City 3,190 ft., Arbuckle 3,451 ft.

ROCKY MOUNTAIN

Big Sand Draw Test To Be Deepened

DENVER.—After making various tests of the Embar horizon at different flow rates, Sinclair-Wyoming Oil Co. 3 Sand Draw Unit, SE SE 10-32n-95w, Big Sand Draw field, Fremont County, Wyoming, was killed, and preparations were made for deepening it into the Tensleep formation where it will be completed. These tests were made through 712 perforations of the 7-in. at 7,060-7,100 and 6,686-6,735 ft., a total interval of 414 ft. The last tests made before killing the well indicated a total of 600 bbl. of distillate and 30,000,000 cu. ft. of gas per day. One gage showed 350 bbl. of 61.6° (cor.) gravity distillate in 14 hours through a 1-in. choke with 14,000,000 cu. ft. of gas. The next test showed 80 bbl. of distillate (68.4° gravity) in 6 hours through a 20/64-in. choke with 10,120,000 cu. ft. of gas. The 7-in. was set on top of the Tensleep at 7,117 ft., and plug was drilled to 7,105 ft. Top of the Embar was at 6,645 ft. This was the third deep test drilled in the field below the Frontier-Dakota gas horizons, and is located ½ mile northwest of the discovery and same distance west of the second well. It found the Embar 312 ft. higher than in the discovery, and the Tensleep plus 100 ft. higher. The third well was the first to make a thorough test of the Embar.

South Sand Draw test.—Sand Draw Oil Co., headed by R. S. Shannon, who was instrumental in bringing about the above mentioned discovery in the Tensleep, is moving in rotary tools for a Tensleep test in South Sand Draw in 1-T South Sand Draw Unit, NE SW NE 26-32n-95w, located 2¼ miles south of the Sinclair-Wyoming wells. Location was made after drilling a series of 2,500-ft. holes to determine the trend of the axis in that area. It is in a unitized block of 3,500 acres centering in Section 36-32-95.

Stratigraphic trap test spudded.—Sharples-Huber-Frontier 1 Murray, SW SE 26-29s-50w, Baca County, southeastern Colorado, first of a series of four exploratory wells to be drilled on the Freezeout block of 130,000 acres in Baca and Bent counties, jointly held by Sharples Corp., J. M. Huber Corp., and Frontier Refining Co., has spudded and is drilling below 1,600 ft. This operation has several unusual features which will make it a most interesting test. The old Marland Oil Co. started a deep test in SE NE 8-30s-50w, Table Mesa area, Baca County, early in 1928, but ran into syenite at 2,085 ft., and abandoned the hole at 2,088 ft., the principal-objective horizons being absent. Rig then was moved 18 miles north and east and the Pipe Springs test in 27-27-49 was drilled to 6,084 ft., finding the formations all in place down to and through the Mississippian and Ordovician. Last year Pacific Western and Frontier drilled their Caddoa test 8 miles northwest of the Pipe Springs well to 5,994 ft., finding the formations down to the Arbuckle in place. The logs of these and other wells pointed to the existence of a stratigraphic trap on the northwest edge of the Anadarko Basin and an intensive study of the area based on subsurface geology followed. The result was the location of the joint test approximately 4 mile northeast of the Table Mesa well and 14 miles southwest of the Pipe Springs well. This operation will be followed in succession by three other tests seeking to locate the trap which is believed to exist in the area.

Madison discovery at Black Mountain.—Texas Co. 3 State, NE SE 36-43n-91w, Black Mountain field, Washakie County, Wyoming, an exploratory well, after testing all horizons through the Cambrian down to a total depth of 5,012 ft., was plugged back and completed as a discovery in the Madison, a deeper pay, making 161.5 bbl. of oil and 77.5 bbl. of water on an 8-hour final test. Top of the Madison was at 3,815 ft., casing was perforated at 3,865-74 ft. Gravity of crude is 22.2°. Black Mountain is an old field with five wells in the Embar-Tensleep estimated capable of making 200 bbl. per day, but which have been shut in for some time. The unit comprises 2,424 acres, of which 615 acres are in the participating area. Principal tops were Tensleep, 3,196; Amsden, 3,625; Madison, 3,815; Big Horn, 4,290; Cambrian, 4,397 ft.

SUCCESSFUL WILDCAT COMPLETION IN WYOMING

Black Mountain, Washakie County: Texas Co. 3 State, NW NE SE 36-43n-91w, TD 5,012 ft., plugged back to 3,936 ft. and completed in Madison for 161.5 bbl. oil and 77.5 bbl. water in swabbing test in 8 hrs. Top Madison 3,815 ft., top Cambrian 4,397 ft.

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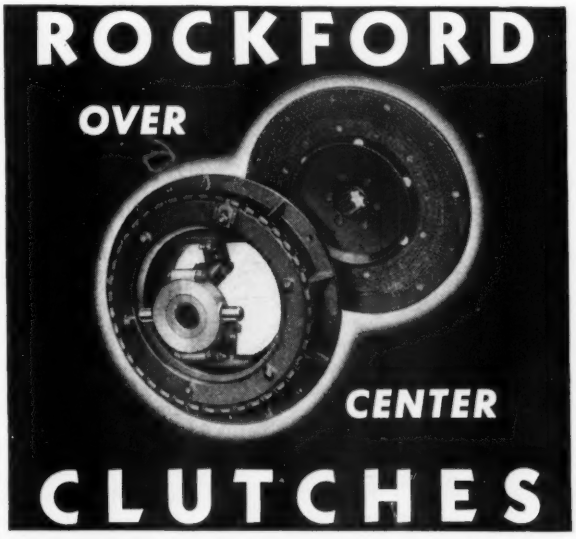

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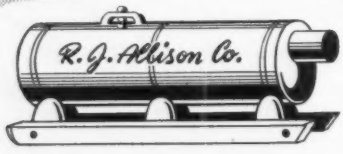

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Among the

Drilling Contractors

Drilling crew of O. L. Riley Co., Ventura, Calif. Picture was taken on drilling location of Larsen Refining Co., Long Beach Harbor, Calif. The men are: Roy N. Patterson, driller; B. F. Viles, catheadman; Jack Christian, lead tongs; L. F. Harley, driller; O. L. Riley, contractor, and L. C. Lamb, drilling superintendent

Barrett & Ross Drilling Co. and **Deep Oil Development Co.** expected to get work under way at their 1 G. T. Hern, Jr., this week. Location is SE NE NE 13-4s-11w, in the new Cache Creek field of Cotton County, Oklahoma.

Ralph M. Parsons Co., Los Angeles, is the contractor on General Exploration Co. 1 Marshburn in the Yorba Linda field. Location is in 23-3s-9w.

T. P. Pike Drilling Co., Los Angeles, is preparing to redrill and deepen Standard Oil Co. of California 1 San Gabriel in the Seal Beach field, California.

Miller & York, Bakersfield, are preparing to start drilling Paso Robles Mutual Oil Development Association's wildcat test in the Paso Robles area of San Luis Obispo County, California. The contractor is also preparing to drill 1 Richardson, 18-29s-21e, in the Sheep Springs area of Kern County.

Noble Drilling Co., Tulsa, will drill a second East Coast deep wildcat for Standard Oil Co. (N. J.). Work was said to be scheduled for starting by the end of September at the new test, which will go to 5,000 ft. Location is 3 miles north of Ocean City. Noble was contractor for Standard's wildcat near Hatteras Light in North Carolina.

Kingery Brothers Drilling Co., which has producing wells in the Cache Creek field, and three drilling, purchased additional acreage there at the lease sale held in Anadarko, Okla., last week by the Kiowa Indian agency.

Big Chief Drilling Co. was reported to be getting under way at its 1 Holliday, SW SW NW 28-10n-3w. Location is on the extreme east side of the West Moore field of Cleveland County, Oklahoma, and on a farmout from

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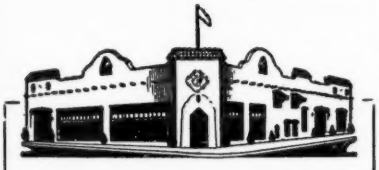

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Margay Oil Co. Objective is the Hunton lime at around 8,000 ft. Same operators will test shallow pay zones in southern Seminole County, Oklahoma. The 1 Jimmie, SW SW SE 2-5n-6e, in the Tyrola area, will drill to 2,600 ft. The 1 Stockton, SE SW NE 1-6n-5e, north of Grayson, had Calvin sand at 2,365 ft. and was drilling below 2,755 ft. last week.

Delta Drilling Co.'s deep test, the 1 Houston, Martin Survey of Van Zandt County, Texas, held interest of operators as it tested in the Rodessa section at 8,305-22 ft. A 15-minute drillstem test recovered 5 ft. of mud with a slight show of gas. Base of the Massive was said to be 8,298 ft., or 7,821 ft. subsea. Same operator's 1 Gauntt, in the Giles Survey of Bowie County, scheduled to test the Paluxy, lost the hole at 3,716 ft. Rig was skidded and the second test got under way last week. Operation is west of the town of Simms.

M. J. Drilling Co., Pittsburg, Tex., has been awarded contract to drill a wildcat for N. F. Ruffner, of Kilgore, Tex. Location is near the town of Huntsville and contract depth is 2,800 ft.

M. J. Delaney, Dallas, has contract for Magnolia Petroleum Co. 1-A Southern Pine, Leonard Williams Survey, scheduled Edwards lime test 2 miles southeast of Weches, Houston County, Texas.

Camay Drilling Co., Los Angeles, has contract for four wells to be drilled by Adams Oil Co. in the Arroyo Grande field with locations falling in 31-31s-13e.

O'Kane & Brian, Inc., Wilmington, have received contract to redrill Nelson et al 1 Tut, a project in the Long Beach field, near the corner of Orange and Willow Streets, Long Beach, Calif.

M. J. Delaney, Dallas, will drill Magnolia Petroleum Co.'s 1-A Southern Pine, in Leonard Williams Survey, Houston County, Texas. Location for the Edwards lime test, which was reported as spudding in last week, is 2 miles southeast of Weches.

Santa Maria Drilling Co., Los Angeles, will redrill Pacific Western Oil Corp. 4 Vincente in the Santa Maria field, Santa Barbara County, California coastal district.

Can-Tex Drilling Co., of Calgary, has contract for a new well to be drilled for McColl-Frontenac Oil Co. and Union Oil Co. on the Pinhorn Dome in southern Alberta. The test, in LSD 7, 6-4-8w4, is planned to extend a large gas field opened recently.

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PERSONALS

Powell To Head New Organization on East Coast

FRED POWELL, president of the newly-formed California Refining Co., has held various positions in the manufacturing department of Standard Oil Co. of California for the past 21 years. His selection to head the East Coast organization established to operate refining and marine-terminal facilities of the Barber Asphalt Co. is a tribute to successful fulfillment of numerous exacting assignments through the years in behalf of the Standard of California.

Powell, a graduate of the University of Washington, started his career in the petroleum industry in 1925 when he went to work in Standard of California's Richmond refinery. Other duties with Standard of California's manufacturing department have given Powell experience in the El Segundo, El Paso, Tex., and Bakersfield refineries. He has been stationed at El Segundo since 1941 as manager of the refinery there.

California Refining Co., a new corporation, was organized under terms of an agreement now awaiting approval by stockholders of Barber Asphalt Co. Standard of California and Barber Asphalt will be stockholders in the new corporation which will operate the latter's petroleum facilities near Perth Amboy, N. J. Through this arrangement, Standard of California will launch its first refinery operation on the East Coast. The company has been building and acquiring marketing outlets in the eastern states for several years.

W. L. Albert, Jr., engineer, with Phillips Petroleum Co., has been transferred from Seminole, Okla., to Bartlesville, Okla.

Dr. George Berry, geologist for The Texas Co. at Tallahassee, has been transferred to Casper to succeed **Ross Heaton** who resigned recently to accept a position with the U. S. Bureau of Reclamation.

John F. Ross, recently released as major in the engineer section of headquarters of the U.S. Eighth Army in Japan, has resumed his duties as a civil engineer in Humble Oil & Refining Co.'s division office in Midland, Tex. He entered the Army early in 1942.

T. O. Criswell, of Carter Oil Co., has been placed in charge of the newly opened office of that company, with **L. J. Beckmann** as geologist. The new offices are located in the Midland Savings Bank building.

Harold L. Severance, Palo Alto, has been elected assistant secretary of Standard Oil Co. of California. He started work with the company in 1933 at the Richmond refinery and subsequently served on the accounting staff of the manufacturing department. Since 1940 he has been attached to the secretary's office.

J. V. Blacklock, assistant chief clerk, East Texas division of Humble Oil & Refining Co., has been appointed policy and organization coordinator of the production operating department at Houston. **N. B. Robbins,** assistant division chief clerk, Louisiana division, and **W. E. Kirkham,** district chief clerk, Talco district, have been transferred to the East Texas division at Tyler, as acting division chief clerks. **Clark Garner,** assistant district district chief clerk, Talco district, will succeed Kirkham. Other Humble production department transfers include: **T. M. Roper,** district chief clerk, Natchez district, to the Louisiana division office, New Orleans, as assistant division chief clerk, and **E. E. Setser,** assistant chief clerk, Paradis, La., district, who will replace Roper at Natchez.

He served as head of the OPA's crude-oil and gas section until its dissolution June 30.

Edmond C. Breene, Jr., chief petroleum engineer for International Petroleum Co., Ltd., in Peru, has been appointed assistant field manager for the company.

C. L. Simmons, superintendent of the natural-gas department of Magnolia Petroleum Co. at Kermit, Tex., has been transferred to Electra, Tex., as superintendent of that division. He has been succeeded by **V. L. Dickinson.**

Norman S. McCausland, assistant treasurer of Atlantic Refining Co., has been elected to the board of directors and named treasurer of the company, filling a position left vacant by the death of Paul Shuman. McCausland has been with the company since 1917.

C. A. Pollard has been appointed assistant general manager of Standard Oil Co. of California's Richmond refinery. He has been employed by the company for 25 years, the last 16 of which have been at the Richmond refinery. **C. W. Rehfuss,** manager of the service division at Richmond, is promoted to manager of the refining divisions, succeeding Pollard in that position.

George W. Hanneken, vice president in charge of manufacturing of Standard Oil Co. (Ohio), has retired after 44 years' service in the petroleum industry. He is a member of the general committee of the American Petroleum Institute and during the war was a member of the petroleum industry refining committee of the Petroleum War Council.

Guy George Gabrielson, general counsel of Carthage Hydrocol, Inc., since its organization several months ago, has been elected president of the company. The company was formed to manufacture gasoline from natural gas and is preparing to erect a $15,000,000 plant near Brownsville, Tex. Gabrielson, a 1917 graduate of Harvard Law

School, will continue his law practice in New York City, a company announcement said.

MARK GARDNER

Mark Gardner, formerly assistant general superintendent in the production department of Phillips Petroleum Co. in Bartlesville, Okla., has joined Loffland Brothers Co. as assistant to **H. L. Sullivan,** president and manager, with headquarters in Tulsa. Associated with Phillips since 1933, Gardner was released last September after 3½ years in the Army, 16 months of which was in Europe with the military pipe-line service.

John H. MacLeod has been named merchandising manager of the New York division of Colonial Oil Co. He succeeds **Benjamin A. Swedish** who has been appointed district manager at Syracuse, N. Y.

J. C. Jordan, vice president and general manager of Rio Grande Valley Gas Co., Brownsville, Tex., retired last week after 12 years in that position. He will be succeeded by **L. O. Vogelsang** of San Antonio.

Harry J. Bodson and **Samuel E. Roth** have been promoted to assistant foreman of the bulk oil pumping and shipping department and instrument shop foreman, respectively, in the Bayonne, N. J., refinery of Tide Water Associated Oil Co.

Charles E. Titus, president of the Rocky Mountain Scout Association, has resigned that position upon being transferred from Casper, where he was Rocky Mountain scout for Sinclair-Wyoming Oil Co., to Salt Lake City, where he will represent that company under the supervision of **C. P. Watson,** division land man at Casper. **Warren Humphries** succeeds as scout, and **Orval Heck,** of Continental Oil Co., succeeds him as president of the Scout Association.

H. H. Anderson, vice president of Shell Pipe Line Corp., Houston, has been named chairman of a committee organized by American industries to assist them in handling problems arising from soil corrosion to underground structures. Anderson was named in St. Louis at a meeting of representatives of Association of American Railroads, American Gas Association, American Petroleum Institute, American Water Works Association, Bell System, Western Union Telegraph Co. and National Association of Corrosion Engineers.

P. C. White, assistant chief chemist at the Whiting refinery of Standard Oil Co. (Ind.), has been appointed chief chemist succeeding **F. M. Rogers** who has retired. **J. C. Bailie** has been named acting assistant chief chemist.

Wallace B. Curtis, a veteran with 22 years of service for General Petroleum Corp., was promoted last week to the newly created position of public relations director. For the past 14 years, Curtis has been advertising manager for General. He will continue to office at Los Angeles. Previous to his service as advertising manager, Curtis was employed for 8 years in the manufacturing and marketing divisions. Before his employment by General, he worked in public relations, advertising and promotion in the commercial aviation and resort fields. Curtis is an engineering graduate of Stanford University and served as an engineering officer in the United States Navy in World War 1. Announcement of Curtis' promotion and the creation of a public relations division was announced at Los Angeles last week at a luncheon arranged by **S. J. Dickey,** president of General Petroleum.

W. B. CURTIS

M. L. Reed, junior exploitation engineer for Shell Oil Co., Inc., has been promoted to exploitation engineer at Black Bayou, La., and **H. G. Starling,** head roustabout at Odessa, Tex., has been named production foreman. Other Shell transfers in the Gulf Coast area include: **R. F. Berry,** senior exploitation engineer, Houston to Seeligson, Tex.; **H. B. Brooks,** production foreman, McCamey, Tex., to Odessa; **C. E. DeWitt,** junior exploitation engineer, Lake Charles, La., to Iowa, La.; **T. P. Dowdy,** drilling foreman, Seeligson to Sheridan, Tex.; **A. T. Guernsey,** junior exploitation engineer, Houston to Hobbs, N. M.; **E. V. Hanson,** senior exploitation engineer, area office to the South Texas Divison; **J. A. Newman,** junior exploitation engineer, Cleveland, Ohio, to Eagle Lake, Tex.; **J. M. Palmer,** exploitation engineer, Seeligson to Houston; **W. L. Wilgus,** senior exploitation engineer, South Texas Division to the West Texas Division at Midland, Tex.; **B. J. Williams,** junior mechanical engineer, Midland to Kilgore, Tex.; and **J. W. Watson,** exploitation engineer, Black Bayou to Houston.

Shifts—

Herman E. Sinclair, engineer, The Texas Co., Montebello, Calif., to Long Beach, Calif.; **C. H. Griffin, Jr.,** engineer, Shell Oil Co., Inc., Ojai, Calif., to Rangely, Colo.; **R. Eckis,** geologist, Richfield Oil Corp., Bakersfield, Calif., to Los Angeles; **Alvin Summers,** superintendent, Sunray Oil Co., Victoria, Tex., to Oklahoma City; **W. S. Brooks,** superintendent, Bridwell Oil Co., Freer, Tex., to Alice, Tex.; **Joseph A. Slicker,** engineer, Stanolind Oil & Gas Co., Andrews, Tex., to Cisco, Tex.; **W. B. Palmer, Jr.,** Superior Oil Co., Conroe, Tex., to Magnolia, Tex.; **Tom Slack,** engineer, Gulf Oil Corp., Overton, Tex., to Kilgore, Tex.; **R. W. Brackhill,** engineer, Shell Oil Co., Inc., Wichita Falls, Tex., to Oklahoma City; **George C. Golden,** manager, Cargo Oil Co., Wichita Falls, Tex., to Dallas; **W. D. Brown,** production foreman, Danciger Oil & Refining Co., Ferriday, La., to Spokane, La.; **A. N. Neal,** superintendent, Gulf Oil Corp., Fairfield, Ill., to Three Sands, Okla.; **Bert Aiguier,** superintendent, Danciger Oil & Refining Co., Natchez, Miss., to Donaldsonville, La.; **Edward C. Berger,** engineer, Standard Oil Co. (Ohio), Cleveland, to Eaton, Ind.; **C. C. Kline,** engineer, Sun Oil Co., Chester, Pa., to Marcus Hook, Pa.; **P. L. Frederick,** superintendent, Fred M. Manning, Inc., Rifle, Colo., to Rangely, Colo.; **R. E. Woods,** geologist, General Petroleum Corp., Casper, Wyo., to Altadena, Calif.

Dr. Eugene B. Nugent of Sun Oil Co. has been appointed manager of a new automobile sales engineering division with offices in Philadelphia.

C. C. Cole has returned to Shell Oil Co., Inc., as chemist at the Sheridan, Tex., cycling plant following his release from the Army. **Edward C. Taber, Jr.,** geologist in Shell's Houston office, also has been released from the Army after 4 years' service.

P. C. White, assistant chief chemist for Standard Oil Co. (Ind.) at its Whiting, Ind., refinery, has been promoted to chief chemist filling the position left vacant by the retirement September 1 of **F. M. Rogers.** Dr. White joined Indiana Standard after receiving his Ph.D. degree from the University of Chicago in 1938. **R. F. Marschner** has been made section leader in charge of exploratory research on petroleum processes. He has been with the company since 1934. Other research staff members have been promoted as follows: **J. C. Bailie,** acting assistant chief chemist; **W. J. Tancig,** group leader in charge of analytical-methods application; **A. P. Lien,** group leader in exploratory research; **J. J. Lukes,** group leader in the pilot-plant section; and **H. S. Wood,** group leader in the light-oils section of the technical service division.

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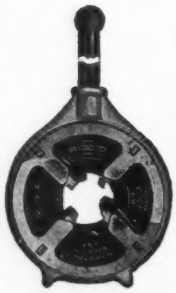

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It fits as it grips . . . and it Holds

Now, get all the benefits of the BMC Pressure Lock Wrench on your heavier work, too. This BMC Husky is so big, so tough, so powerful that any nut, bolt, stud or pipe you can get hold of will give before the wrench will spring or slip. It's 11" long, has a 1½" jaw opening, and grips with 1½ ton pressure.

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Will not slip or round edges. Requires no fussy adjustment to get a tight fit. By an exclusive patented arrangement that moves the jaw end of the toggle for varying sizes of grip, the jaws are always parallel and always fit tightly when they close. Difficult-to-reach nuts and studs can be loosened by the tip of the jaws only, because the BMC Pressure Lock Wrench *grips to the very tip.*

6 TOOLS IN 1 . . .

Use it for other jobs, too. It's actually 6 tools in 1 — a complete kit that can fit in your pocket, and be operated by one hand. Even its 1½ ton pressure can be released by the flick of a finger, or can be left gripping after you remove your hand. Ask for it at plumbing, hardware, electrical, mill supply, or auto supply stores.

ALL THESE *Uses . . .*

Adjustable end wrench
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Equipment Men in the News

Gar Wood Names Three to New Posts

W. G. TUTTLE

W. Gerard Tuttle, formerly director of industrial relations of the San Diego division of Consolidated-Vultee Aircraft Corp., has been named director of industrial relations of Gar Wood Industries, Inc., it is announced by Charles W. Perelle, president.

Perelle also announces that Clifford A. Sharpe, who began his business career as a tool and die maker at Boeing Airplane Co., has been named works manager of Gar Wood, in

C. A. SHARPE

R. L. BARTLEY

charge of the company's manufacturing activities.

Robert L. Bartley, for the past 12 years sales engineer of the tank division of Gar Wood, has been named sales manager of the division, according to W. H. Hammond, vice president in charge of sales. Bartley joined the company in 1925 as a district sales manager.

Dallas Aircraft Sales Moves Offices

Dallas Aircraft Sales, Inc., Beechcraft airplane distributors for portions of Louisiana, Texas, and Oklahoma, with headquarters at Love Field, moved their offices to the Southwest Airmotive Building (Hangar No. 4), 3416 Love Field Drive, according to announcement by Jim Gray, vice president.

Dallas Aircraft Sales and Southwest Airmotive will work closely together, Gray said, to offer enlarged sales and service facilities for private airplane owners in Dallas and surrounding territory.

A.C.F. Appoints Onderdonk Assistant Vice President

Announcement is made by American Car & Foundry Co. that J. F. Onderdonk has been appointed an assistant vice president. He will continue to make his headquarters at the Chicago sales office. Onderdonk has been associated with A.C.F. since 1912.

Oil Well Appoints Four

Oil Well Supply Co., Dallas, has announced four new appointments in its personnel. L. L. Mitchell has been made assistant treasurer and assistant general credit manager, with headquarters in Dallas. He joined the company in 1940 and has served at offices in Los Angeles, Oil City, and Columbus. C. M. Wittum has been appointed eastern division credit manager, with headquarters in Columbus. F. D. Smith has been appointed assistant general manager for sales. He has been with the company for 18 years. John E. Miller has been made machinery service manager, general sales department. He started with the company as a student engineer in 1933.

Farley and Schlegel Get New Posts With Brown Instrument Co.

I. K. Farley has been named petroleum industry sales manager of the Brown Instrument Co., Philadelphia, it is announced by L. Morton Morley, vice president and general sales manager.

R. A. Schlegel has been transferred from the Chicago office of the Brown division of Minneapolis-Honeywell Regulator Co. to the New York office where he will assume duties formerly under supervision of Farley. Farley will coordinate field sales activities in the petroleum industry and conduct market studies. He will make his headquarters at the Philadelphia main office of the company. Schlegel will have charge of petroleum accounts in the New York area.

Johnson Joins A. O. Smith

W. Stuart Johnson has joined A. O. Smith Corp. as manager of hydraulic products sales in the Pacific Coast district. He will make his headquarters in the Los Angeles office of the company. Johnson previously was with Southern California Edison, Inc., as engineer in charge of pumping equipment. Prior to his war service, he was associated with the Byron Jackson Co. and Ingersoll-Rand Co.

Penn Electric Opens Additional Factory

A new factory building at 1351 Roosevelt Avenue, Indianapolis, has been leased by Penn Electric Switch Co. of Goshen, Ind. This latest acquisition boosts the company's total to three factories. The second factory was put into operation on January 1 in Toronto.

New Director for Marmon-Herrington

Russell L. White, Indianapolis banker and business man, has been elected a member of the board of directors of Marmon-Herrington Co., Inc., of that city.

Inland Steel Promotes Two

Announcement has been made by Inland Steel Container Co., subsidiary of Inland Steel Co., that Gordon D. Zuck has been appointed general manager of sales and J. Doyle Moore assistant general manager of sales. Zuck joined the company in 1932 as advertising and sales promotion manager and previous to this new appointment held the post of assistant general manager of sales. Moore has been with the company since 1929. During this time he has been active in sales work and as assistant secretary-treasurer.

Key Company Makes Changes in Personnel

The board of directors of Key Co., East St. Louis, Ill., recently recalled Bernard J. Gross from its New York office and elected

E. H. MOLLMAN

B. J. GROSS

him vice president and sales manager. At the same time E. H. Mollman was recalled from the Chicago office and elected vice president in charge of manufacturing.

Gross will be succeeded in the New York office by Fred McCormick, former purchasing agent for the company, and Mollman will be succeeded in the Chicago office by Stanley J. Edwards, who formerly handled refinery-equipment sales at the company's East St. Louis office.

A.C.F. to Display Lubricated Plug Valves

At the Iron and Steel Exposition to be held in Cleveland, October 1 to 4, 1946, inclusive, American Car & Foundry Co. will have on display several types of A.C.F. lubricated plug valves in pressures from 125 to 500 lb., sizes 2, 3, 4, 8, 10 and 12-in. The exhibit which will cover steel, semi-steel, and bronze valves will also feature some special gas reversing valves for use in manifolds on coke ovens, as well as multiport valves.

Mack Announces New Personnel Director

D. R. COLLIN

Appointment of Dwight R. Collin as personnel director of Mack Manufacturing Corp. has been announced by C. T. Ruhf, president. Collin has been associated with the New York City law firm of Chadbourne, Wallace, Parke & Whiteside.

Born in Richmond Hill, N. Y., Collin received his early schooling at Fayetteville, N. Y., before studying law at Syracuse University and Colgate. After 4 years of clerking in the New York City offices of Collin, Wells & Hughes, a firm established by his grandfather, he was admitted to the New York bar.

Anderson Heads Jessop Division

I. B. Anderson has been appointed manager of the stainless steel division of Jessop Steel Co., Washington, Pa., according to a recent announcement by T. W. Pennington, vice president in charge of sales. Anderson has been associated with the steel industry for 24 years.

McNeill Named Store Manager

Continental Supply Co. has announced the appointment of L. D. McNeill as store manager of their Houston branch. He succeeds R. L. Pebworth who has resigned.

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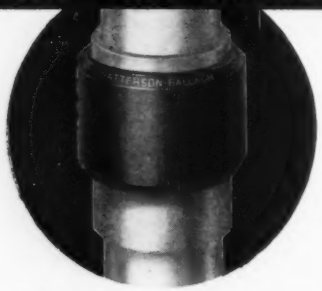
SAVE YOUR TUBING!



Tubing collars worn by contact with casing steal the profit out of pumping. Patterson - Ballagh Plastic Tubing Protectors prevent both collar and casing wear. Oil-proof, wear-resistant, insulating. They are cemented to the collar under pressure and will not come off. Made in all sizes. End your tubing troubles. CALL in your Patterson-Ballagh man.

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TYPE 'A'
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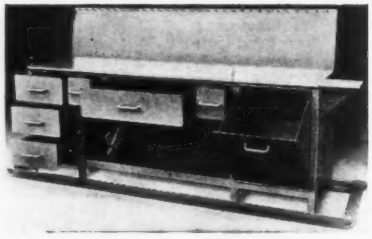

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Cummins Engine Co. Appoints Don Cummins as Quality Control Manager

DON CUMMINS

Don Cummins, youngest brother of C. L. Cummins, company founder and president, has been appointed quality manager to serve as final authority on decisions affecting the quality of Cummins engines, according to V. E. McMullen, general manager of Cummins Engine Co., Inc. Cummins has been with the company since 1919. For the last 5 years he has been director of research, in charge of the experimental and test laboratory, working closely with H. L. Knudsen, vice president in charge of engineering.

Wickwire Spencer Moves General Sales Manager's Office

Wickwire Spencer Steel, division of Colorado Fuel & Iron Corp., has moved its general sales manager's office from 500 Fifth Ave., New York, to 361 Delaware Ave., Buffalo. This move brought the top sales and production department officials into one location where it will be possible to better coordinate and bring about maximum efficiency in their service to the trade. Involved in the move were A. G. Bussman, vice president in charge of sales, and H. C. Allington, assistant general sales manager. The wire department general office under C. G. Matthews also moved to Buffalo as did the market research department under Henry Davis.

International Harvester Makes Shifts

International Harvester Co. has announced the following changes in motor truck personnel:

E. A. Razek, formerly retail motor-truck manager at the Richmond motor-truck branch, has been transferred to the Atlanta motor-truck branch as assistant manager. B. G. Jones, formerly credit manager at Louisville, has been appointed sales manager, Louisville motor-truck branch.

Riggins To Leave for South America

W. H. RIGGINS

William H. Riggins, export sales representative for Hydril Co., will leave from New York September 15 for Trinidad, the first stop on a trip which will take him to Venezuela, Colombia, Peru, and Ecuador. He will visit Mexico on the return trip to Los Angeles, where he will arrive late in December. Before leaving on his trip, Riggins will spend a week in New York with Earl M. Daniels, vice president and general sales manager of the company. Riggins has been with Hydril for 8 years as field representative and sales engineer in Texas, Mid-Continent and California.

Houdry New York Offices Moved

Expansion of engineering and service facilities has necessitated the removal of New York offices of Houdry Process Corp. to new and larger quarters at 25 Broad Street, New York. Located at the New York address will be R. B. Cragin, Houdry vice president, together with his staff of commercial development engineers, process design and project analysis divisions. Former address was 115 Broadway, New York.

Logelin New Director Of Public Relations

Appointment of Edward C. Logelin, Jr., as director of public relations, United States Steel Corp. subsidiaries, Chicago district, is announced by J. Carlisle MacDonald, assistant to chairman of the board, United States Steel Corp. He succeeds Arthur C. Wilby, who was elected vice president, United States Steel Corp. of Delaware, August 14.

TIPSA to Represent Hammond Iron Works in Argentina

Hammond Iron Works, Warren, Pa., announce as their representatives in the Argentine the Tecnica Industrial y Comercial Petrolera, Soc. An. (known as TIPSA) whose headquarters are Av. R. S. Pena 501, Buenos Aires.

Gresh Named Vice President And General Manager of Flotrol

W. A. GRESH

William A. Gresh has been named vice president and general manager of Flotrol Systems, Inc., Tulsa, according to an announcement by Warner Lewis, company president. Gresh as secretary-treasurer of Flotrol, had made his headquarters in New York City and Washington during the war. When Flotrol was moved from New York to Tulsa, Gresh was brought to Tulsa in the new capacity of vice president and general manager.

Porter Acquires Brake Equipment & Supply Co.

H. K. Porter Co., Inc., Pittsburgh, has announced the acquisition of Brake Equipment & Supply Co., of Chicago. The new plant will make a total of eight plants operated by the Porter company, whose products include locomotives, railway specialties, springs, chemical equipment, pumps and oil-field equipment.

Appointed Assistant Chief Engineer

Appointment of Ernest E. Theiss as assistant chief engineer of Davey Compressor Co., Kent, Ohio, was announced recently by Paul H. Davey, president.

Ackart Resigns Du Pont Post

E. I. du Pont de Nemours & Co. has announced the retirement of Everett G. Ackart, chief engineer, and the appointment of Granville M. Read to succeed him. Read has been assistant chief engineer of the company since 1943.

Holmberg Joins Alloy Steel

Emil G. Holmberg has been appointed consulting metallurgist for Alloy Steel Products Co., Linden, N. J. A graduate of the Colorado School of Mines, Holmberg for a number of years was research metallurgist specializing in corrosion problems at the Belle, W. Va., plant of E. I. du Pont de Nemours & Co.